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AEROSPACE FACTS and FIGURES

AEROSPACE INDUSTRIES
ASSOCIATION OF AMERICA, INC.
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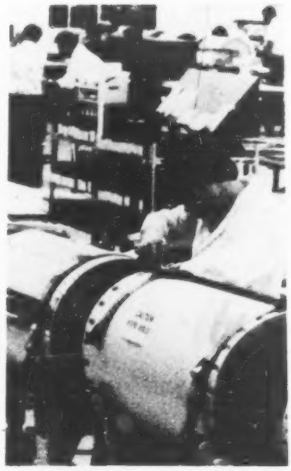
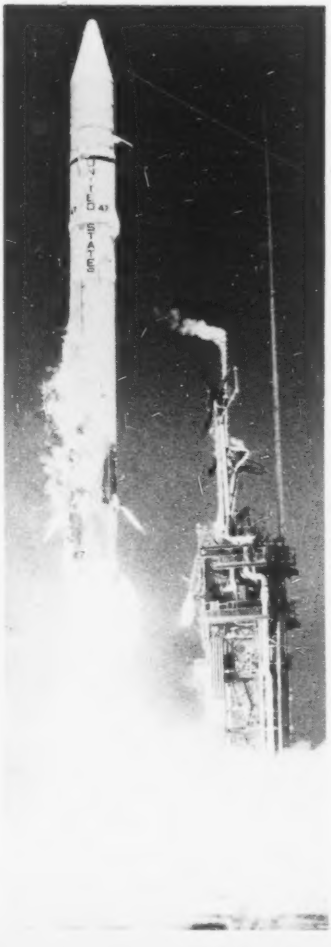


Aerospace is high drama, both in technological and human terms. Leading edge aerospace technology breaks barriers and expands possibilities. It has taken man to the moon and allowed him to travel, work and—ultimately—to live outside the bounds of earth. The history of aerospace is one of technological and human firsts played out in the newsreels, in motion pictures, on our television screens. Yet startling new technologies have evolved into everyday progress in air transportation and in spinoff advances that affect our health, safety and quality of life. Behind the drama of U.S. aerospace advances are the industry's 1.3 million men and women—pushing at the frontiers of knowledge and accomplishment.



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FOREWORD

In 1984, sales of civil aircraft dipped to the lowest level in more than 30 years. That was a key factor in the aerospace industry's performance for the year, a circumstance that restricted overall sales growth despite solid gains in other areas of industry effort.

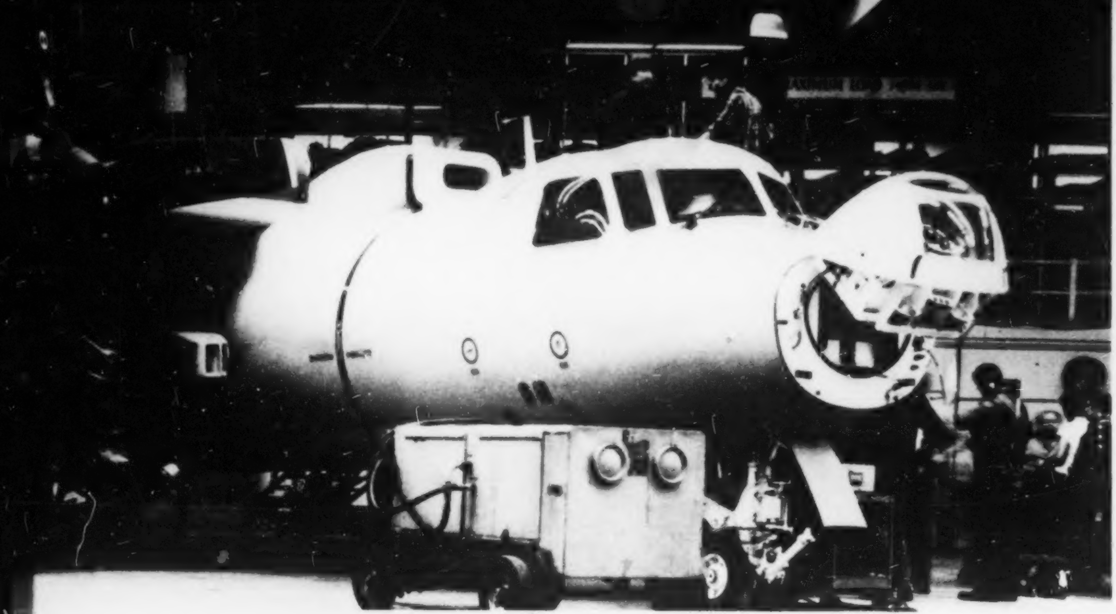
The industry actually experienced a slight decline in inflation-adjusted terms, but the year-to-year comparison may be influenced by a comprehensive revision of statistical reporting procedures intended to reflect more accurately the industry's activities. The industry regards 1984 as a generally good year in spite of the flat sales curve. Current dollar gains were recorded in every product category except civil aircraft—and in that lone area of reduced sales there was cause for optimism in a flow of new orders for commercial transports, suggesting a new upturn in civil aircraft workload.

A highlight of the aerospace year 1984 was the industry's performance in the international marketplace. In a year in which the United States suffered the worst trade deficit in its history, the aerospace industry once again recorded a strong positive balance that offset to some degree the adverse impact of trade losses in other areas. The surplus of $10.3 billion was achieved despite a drop of $1.5 billion in exports of transport aircraft, normally the principal component of export sales, and despite a record level of aerospace imports. This is gratifying testimony to foreign acceptance of American aerospace products; it underlines once more the importance to the U.S. economy of high-value, high-technology aerospace exports.

The industry's outlook for coming years is particularly hazy, due to uncertainty about future defense funding. Congressional concern about the national deficit brought reductions in the Fiscal Year 1986 defense request to what is essentially a zero-growth level and Congressional sentiment appears to favor continued restriction of defense expenditures. Nonetheless, the Administration has declared its intention to push for three percent real annual increases for the rest of this decade. The outcome is not now predictable and neither, therefore, is the industry's future activity level, because sales to the Department of Defense customarily represent well over half of the industry's total sales.

Congressional approval of NASA's space station project, coupled with indications of growth in commercial (non-NASA) space endeavors, augur a high level of industry space workload for the rest of this decade. And, as earlier noted, the signposts point to a resurgence of commercial transport sales and substantially greater manufacturing activity in what has been an area of decline for most of this decade. Even if we assume somewhat reduced defense production assignments, it would appear that the aerospace industry will maintain a healthy overall workload at least throughout the 1980s.

Karl G. Harr, Jr.
President
Aerospace Industries Association



AEROSPACE SUMMARY

In 1984, the aerospace industry recorded a solid gain in total sales despite the fact that sales of civil aircraft dipped to the lowest level in six years. Substantial increases in sales of military aircraft, missiles and space systems more than offset the $1.7 billion decline in civil aircraft volume to produce a net increase of $3.5 billion, or 4.4 percent.

Here is a breakdown of the industry's performance in 1984:

Sales. In current dollars, total sales amounted to $83.5 billion, up from $80 billion in 1983. As is customary, sales of aircraft predominated in the breakdown by product group. At $41.9 billion, aircraft sales were down more than $500 million from the previous year; a big gain of $1.2 billion in military aircraft sales failed to offset the larger drop in civil sales. Military sales of $31.2 billion accounted for almost three quarters of total aircraft sales.

As was the case in the previous year, space sales placed second among the various product categories. Sales of space systems amounted to $16.3 billion, up from $13.9 billion in 1983—an increase of 17 percent and the largest percentage gain among the product groups. Increases were also recorded in sales of missile systems (up $1 billion to $11.3 billion) and in the "related products and services" group (up about $600 million to $13.9 billion).

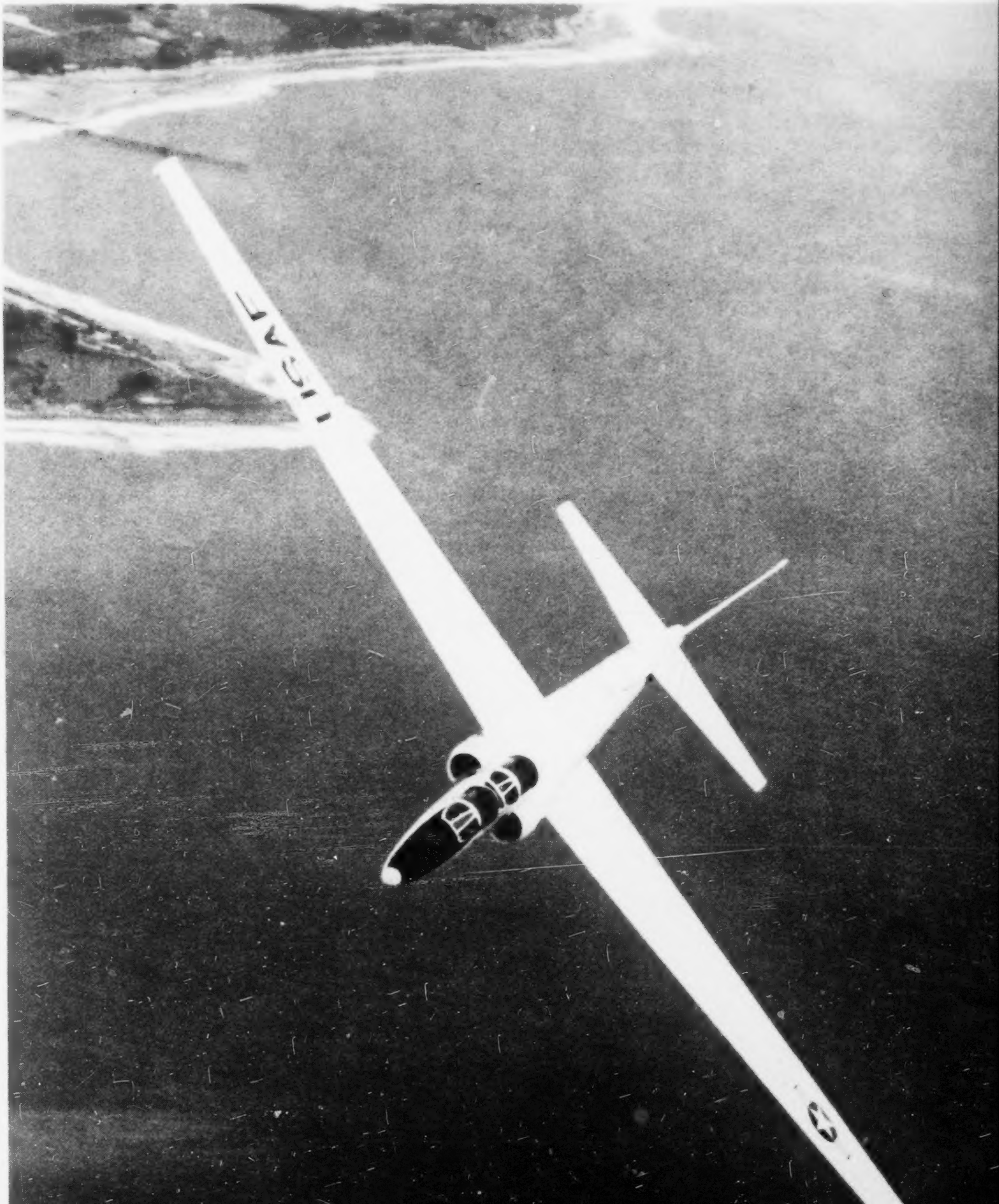
Aerospace sales in 1984 represented 2.3 percent of the Gross National Product (down from 2.4 percent in 1983) and 3.7 percent of total sales by all U.S. manufacturing industries (down from 3.9 percent).

When converted to constant dollars by the revised aerospace composite deflator, the industry's sales volume declined in 1984. The major contributing factor was reduced civil aircraft sales, which are expected to rebound in the near future as a result of a flow of new orders. In inflation-adjusted terms, sales of military aircraft and "related products and services" were nearly level, while sales gains were realized in missiles and space systems.

Profit. The industry recorded a profit after taxes of $3.6 billion, up from $2.8 billion in 1983 and above the previous all-time high of $3 billion. As a percentage of sales, the profit rate was 4.1 percent, up from 3.5 percent in 1983 and slightly above the 3.9 percent average for the first five years of the 1980s. The 1984 profit rate remained below the average for all U.S. manufacturing corporations, which was 4.6 percent.

Orders and Backlog. Optimism for future years was indicated by a record $105 billion in new orders received during 1984 and a year-end backlog that reached an all-time high of $133.5 billion. The backlog was composed of $86.6 billion in orders from the U.S. government and $46.9 billion in work for other customers.

As is traditional, orders for aircraft—including engines and parts—constituted the principal element of the backlog, $70.3 billion or 52.7 percent of the total. Orders from the government, principally military aircraft, increased over 1983 by $5.6 billion to a total of $36.3 billion. Orders from "other" customers—largely airline orders for transport aircraft—climbed by $4.3 billion, the greatest annual gain since 1980. This confirmed earlier predictions that the decline in civil



aircraft sales would bottom in 1984 and the sales curve would begin a new ascent.

Civil Aircraft Production. In 1984, the industry shipped 2,999 civil aircraft, the lowest figure in more than 30 years; it compares with 3,356 in 1983. The drop marked the sixth consecutive year of decline in the number of units shipped. The dollar value of shipments also declined, from $9.8 billion in 1983 to $7.7 billion in 1984. The latter figure differs from the $10.7 billion for civil aircraft shown in the summary tables; it covers only complete aircraft shipments during the year while the larger figure includes the value of spare engines and parts.

As usual, the bulk of the dollar value was in sales of commercial transport aircraft. The industry delivered 185 jetliners, 77 fewer than in 1983; their total value was $5.7 billion, down from $8 billion in the previous year. However, the backlog of orders for airline transports jumped significantly, from $12.6 billion in 1983 to $16.6 billion at year-end 1984. Transport units on order numbered 489, compared with 352 a year earlier; the backlog included 167 foreign orders, up from 139 at the end of 1983.

In terms of numbers, civil helicopter production fell off for the fourth straight year, dropping from 403 aircraft in 1983 to 376 in 1984. Helicopter dollar value increased to $330 million (from $303 million in 1983) but the 1984 sales volume was down to roughly half that of the peak year 1980.

Shipment of general aviation planes totaled 2,438 units valued at $1.7 billion, which compares with 2,691 units worth $1.5 billion in the previous year.

Military Aircraft Production. The industry produced 930 military aircraft in 1984, 123 fewer than in 1983 and the lowest figure since the start of the Reagan Administration's defense buildup. The 1984 deliveries included 555 planes for the U.S. military services and 375 units shipped abroad under Foreign Military Sales programs or commercial contracts with foreign governments. The 555 U.S. aircraft delivered compared with 766 in the previous year.

Department of Defense outlays for aircraft procurement totaled $23.2 billion in FY 1984; the estimate for FY 1985 was $27.1 billion.

Missile Programs. The $11.3 billion in sales of missile systems, including propulsion units and R&D contracts, represented a gain of $1 billion in current dollars but only a slight increase when adjusted for inflation. Bureau of the Census figures on missile sales, which exclude propulsion systems and R&D funding, show a record of $6.1 billion, up from $6 billion in 1983. New orders for missile systems amounted to $7.7 billion and the missile backlog increased substantially, from $8.4 billion in 1983 to $10 billion at the end of 1984.

Space Programs. At $16.3 billion, combined sales of military and civil space systems, including R&D work, reached an all-time high; the comparable figure for 1983 was $13.9 billion. As in previous years of the 1980s, the space sales growth was due almost entirely to the rapidly expanding military space program, as is evident in federal budget authority data. DoD's budget authority for FY 1985 was $12.9 billion, compared with $10.6 billion in FY 1984. NASA's allocation was $6.8 billion in FY 1985, up from $6.6 billion in the previous year.

Research and Development. According to McGraw-Hill Economics in its annual survey of U.S. business plans for research and development expenditures, aerospace outlays for research and development totaled $16.7 billion in 1984, more than 20 percent above the $13.7 billion spent in the preceding year. The average 1984 increase among U.S. businesses as a whole was estimated as 12.3 percent by McGraw-Hill and 10.9 percent by the National Science Foundation.

For 1985, McGraw-Hill estimated aerospace R&D spending at $18.3 billion, an increase of 9.4 percent. The survey's projection for the years 1985-88 indicates that aerospace outlays will continue to rise, but at a slower pace; aerospace R&D spending was expected to reach an annual level of $21.7 billion by 1988.

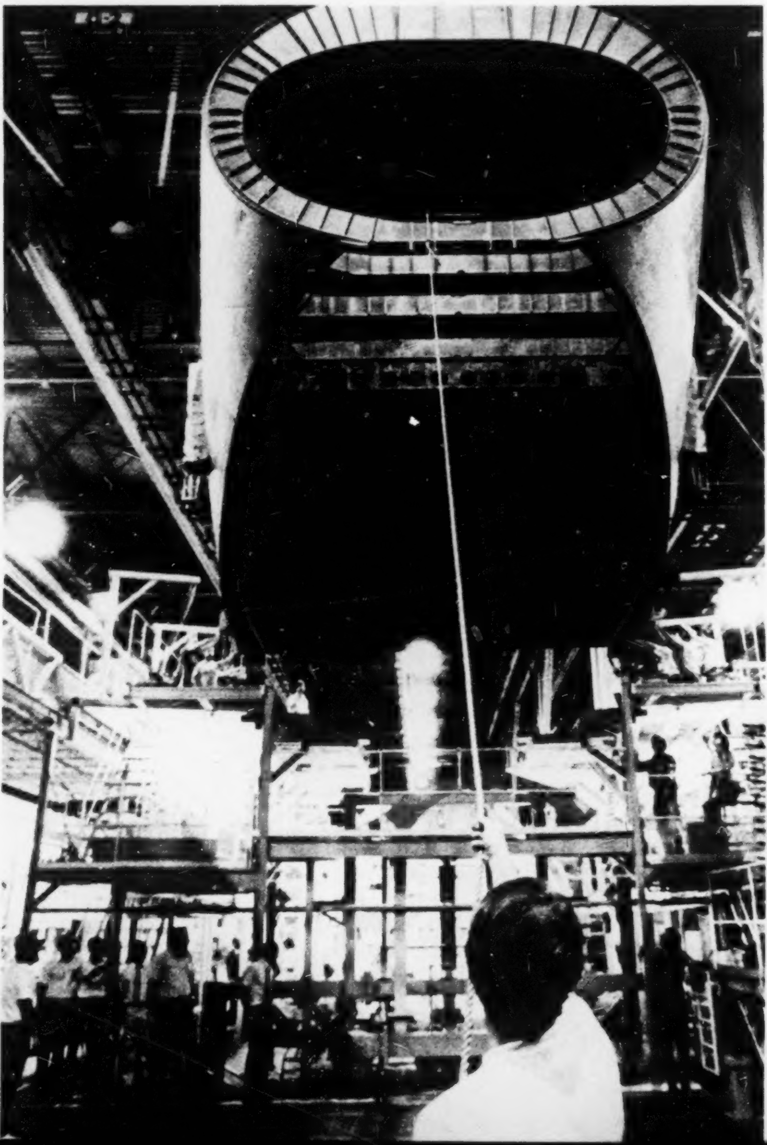
Foreign Trade. In 1984, when the U.S. as a whole recorded an international trade deficit of $111 billion, the worst in history, the aerospace industry once again produced a solid offsetting trade balance. The aerospace surplus was $10.3 billion, despite the fact that aerospace exports fell well below the prior year's level and aerospace imports set a new record.

The $10.3 billion trade balance compares with $12.6 billion in 1983 and the all-time high of $13.1 billion in 1981. The 1984 figure resulted from exports amounting to $15 billion (down from $16.1 billion in 1983) and imports of $4.7 billion (up from $3.4 billion).

The composition of the aerospace export volume was roughly 65 percent civil products, 35 percent military, a ratio close to that of the previous year. Civil aerospace exports totaled $9.7 billion, down from $10.6 billion in 1983; military exports were $5.4 billion, close to the previous year's $5.5 billion. The aerospace import gain over 1983 was compounded of an approximately $700 million increase in civil imports and a boost of more than $500 million in military exports.

Employment. At the end of 1984, total aerospace industry employment reached 1,252,000, the highest level since the late 1960s. According to the annual AIA survey of industry employment, a breakdown of the total shows 625,000 employees working on production of aircraft, engines and parts; 306,000 engaged in fabrication of missile and space systems; and 321,000 producing "other related products." The 1983-84 employment gain was 6.9 percent.

By the end of 1985, according to an Aerospace Industries Association survey, industry employment will increase to 1,299,000, 3.8 percent above the year-end 1984 figure. The expected breakdown is 650,000 in aircraft production, 313 in missile and space activities and 326,000 working on other related products.



STANDARD INDUSTRIAL CLASSIFICATIONS APPLICABLE TO THE AEROSPACE INDUSTRY

3721 AIRCRAFT

37211	Complete Aircraft, Military Type
37212	Complete Aircraft, Personal & Utility Type
37213	Complete Aircraft, Commercial Transport Type
37214	Modifications, Conversions, Overhaul of Aircraft
37216	Other Aeronautical Services on Aircraft

3724 AIRCRAFT ENGINES AND ENGINE PARTS

37241	Aircraft Engines for U.S. Military Customers
37242	Aircraft Engines for Other than U.S. Military
37243	Aeronautical Services on Aircraft Engines
37244	Aircraft Engine Parts and Accessories

3728 AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, NEC

37281	Aircraft Parts & Accessories, NEC
37283	Research and Development on Aircraft Parts
37285	Aircraft Propellers and Parts

3761 GUIDED MISSILES AND SPACE VEHICLES

37611	Missile Systems, Excluding Propulsion
37612	Space Vehicle Systems, Excluding Propulsion
37613	Research & Development on Complete Missiles
37614	Research & Development on Complete Space Vehicles
37615	All Otber Services on Complete Missiles & Space Vehicles

3764 SPACE PROPULSION UNITS AND PARTS

37645	Complete Missile or Space Vehicle Engines and/or Propulsion Units
37646	Research and Development on Complete Missile or Space Vehicle Engines and/or Propulsion Units
37647	All Other Services on Complete Missile or Space Vehicle Engines and/or Propulsion Units
37648	Missile and Space Vehicle Engine and/or Propulsion Unit Parts and Accessories

3769 SPACE VEHICLE EQUIPMENT, NEC

37692	Missile & Space Vehicle Parts & Subassemblies, NEC
37694	Research & Development on Missile & Space Vehicle Parts & Components, NEC

3662 RADIO AND TELEVISION COMMUNICATION EQUIPMENT

36621	Communication Systems and Equipment, Including Space Satellite Communications Systems
36625	Search & Detection Systems and Navigation and Guidance Systems & Equipment
36629	Electronic Systems and Equipment NEC, including Electronic Trainers and Simulators

3811 ENGINEERING AND SCIENTIFIC INSTRUMENTS

38111	Aeronautical, Nautical, and Navigational Instrumens, except Aircraft Engine Instruments

3829 MEASURING AND CONTROLLING DEVICES

38291	Aircraft Engine Instruments except Flight

Source: U.S. Government Office of Management and Budget, *Standard Industrial Classification Manual, 1972* (incorporating revisions from the 1977 Supplement).

NOTE: The Standard Industrial Classification (SIC) is a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. It is revised periodically to reflect the changing industrial composition of the economy.

NEC: Not elsewhere classified.

AEROSPACE INDUSTRY SALES[r] BY CUSTOMER

Calendar Years 1967-1984
(Millions of Dollars)

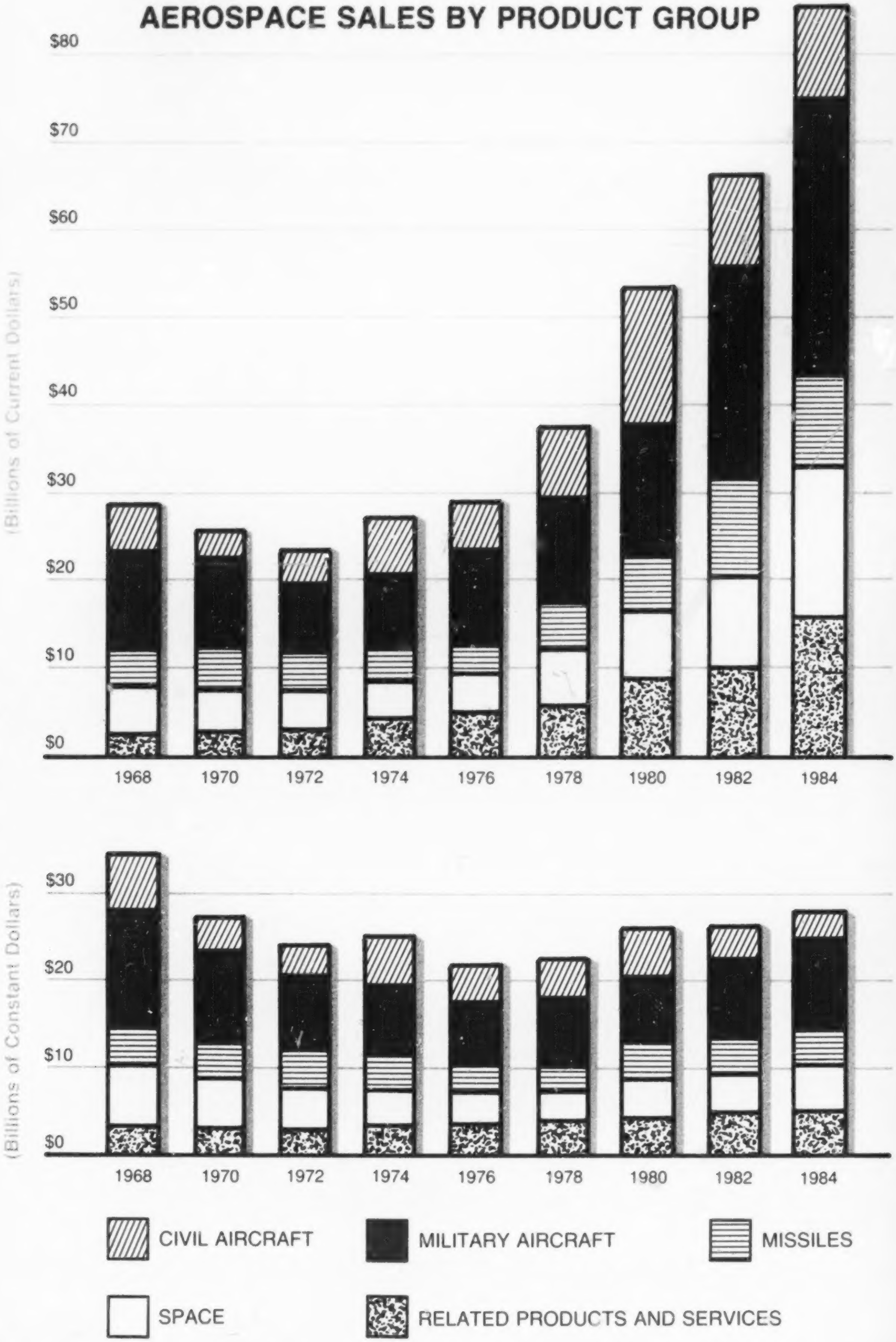
Year	TOTAL SALES	Aerospace Products and Services				
		Total	U.S. Government		Other Customers	Related Products and Services
			Dept. of Defense	NASA and Other Agencies		
CURRENT DOLLARS						
1967	$27,245	$24,665	$16,016	$4,219	$ 4,430	$2,580
1968	28,916	26,367	16,598	3,978	5,791	2,549
1969	27,219	24,520	15,773	3,369	5,378	2,699
1970	25,555	22,911	14,642	3,000	5,269	2,644
1971	22,775	20,252	12,588	2,779	4,885	2,523
1972	23,610	20,964	13,293	2,649	5,022	2,646
1973	25,837	22,494	12,939	2,459	7,096	3,343
1974	27,454	23,387	12,638	2,608	8,141	4,067
1975	29,686	24,894	13,125	2,838	8,931	4,792
1976	29,825	24,514	13,403	2,938	8,173	5,311
1977	32,199	26,095	14,368	3,012	8,715	6,104
1978	37,702	30,889	15,533	3,151	12,205	6,813
1979	45,420	37,705	18,918	3,453	15,334	7,715
1980	54,697	45,878	22,795	4,106	18,977	8,819
1981	63,974	53,090	27,244	4,709	21,137	10,884
1982	67,756	56,366	34,016	4,899	17,451	11,390
1983	79,975	66,646	41,558	5,910	19,178	13,329
1984	83,486	69,572	45,969	6,063	17,540	13,914
CONSTANT DOLLARS (Aerospace Composite Price Deflator, 1972 = 100)						
1967	$33,064	$29,933	$19,437	$5,120	$ 5,376	$3,131
1968	34,059	31,057	19,550	4,686	6,821	3,002
1969	30,826	27,769	17,863	3,815	6,091	3,057
1970	27,390	24,556	15,693	3,215	5,647	2,834
1971	23,479	20,878	12,977	2,865	5,036	2,601
1972	23,610	20,964	13,293	2,649	5,022	2,646
1973	25,012	21,775	12,526	2,380	6,869	3,236
1974	24,469	20,844	11,264	2,324	7,256	3,625
1975	23,504	19,710	10,392	2,247	7,071	3,794
1976	21,644	17,790	9,726	2,132	5,931	3,854
1977	21,538	17,455	9,611	2,015	5,829	4,083
1978	22,739	18,630	9,369	1,900	7,361	4,109
1979	24,631	20,447	10,259	1,873	8,316	4,184
1980	26,373	22,121	10,991	1,980	9,150	4,252
1981	27,587	22,893	11,748	2,031	9,115	4,693
1982	26,561	22,096	13,334	1,920	6,841	4,465
1983	28,872	24,060	15,003	2,134	6,923	4,812
1984	27,782	23,152	15,298	2,018	5,837	4,630

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," "Other Customers," and "Related Products and Services."

[r] A comprehensive revision of the AIA aerospace industry sales series for 1967-1984 was completed in 1985 in order to incorporate different data sources and estimating procedures selected to better reflect the evolving composition of the aerospace industry.

AEROSPACE SALES BY PRODUCT GROUP



Source: Aerospace Industries Association

AEROSPACE INDUSTRY SALES' BY PRODUCT GROUP

Calendar Years 1967-1984
(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Related Products & Services
		Total	Civil	Military			
CURRENT DOLLARS							
1967	$27,245	$14,606	$ 3,562	$11,044	$ 4,058	$ 6,001	$ 2,580
1968	28,916	16,316	5,025	11,291	4,080	5,971	2,549
1969	27,219	14,975	4,267	10,708	4,250	5,295	2,699
1970	25,555	14,061	4,382	9,679	4,125	4,725	2,644
1971	22,775	12,213	3,764	8,449	3,678	4,361	2,523
1972	23,610	12,516	4,181	8,335	4,285	4,163	2,646
1973	25,837	14,144	5,742	8,402	4,224	4,126	3,343
1974	27,454	14,867	6,320	8,547	4,108	4,412	4,067
1975	29,686	16,443	6,463	9,970	3,775	4,686	4,792
1976	29,825	16,056	6,007	10,049	3,671	4,787	5,311
1977	32,199	16,988	6,183	10,805	4,106	5,001	6,104
1978	37,702	21,074	8,222	12,852	4,098	5,717	6,813
1979	45,420	26,382	13,227	13,155	4,778	6,545	7,715
1980	54,697	31,464	16,285	15,179	6,469	7,945	8,819
1981	63,974	36,062	16,427	19,635	7,640	9,388	10,884
1982	67,756	35,484	10,982	24,502	10,368	10,514	11,390
1983	79,975	42,431	12,373	30,058	10,269	13,946	13,329
1984	83,486	41,905	10,690	31,215	11,335	16,332	13,914
CONSTANT DOLLARS (Aerospace Composite Price Deflator, 1972 = 100)							
1967	$33,064	$17,726	$ 4,323	$13,403	$ 4,925	$ 7,283	$ 3,131
1968	34,059	19,218	5,919	13,299	4,806	7,033	3,002
1969	30,826	16,959	4,832	12,127	4,813	5,997	3,057
1970	27,390	15,071	4,697	10,374	4,421	5,064	2,834
1971	23,479	12,591	3,880	8,710	3,792	4,496	2,601
1972	23,610	12,516	4,181	8,335	4,285	4,163	2,646
1973	25,012	13,692	5,559	8,134	4,089	3,994	3,236
1974	24,469	13,250	5,633	7,618	3,661	3,932	3,625
1975	23,504	13,011	5,117	7,894	2,989	3,710	3,794
1976	21,644	11,652	4,359	7,292	2,664	3,474	3,854
1977	21,538	11,363	4,136	7,227	2,746	3,345	4,083
1978	22,739	12,710	4,959	7,752	2,472	3,448	4,109
1979	24,631	14,307	7,173	7,134	2,591	3,549	4,184
1980	26,373	15,171	7,852	7,319	3,119	3,831	4,252
1981	27,587	15,551	7,084	8,467	3,295	4,048	4,693
1982	26,561	13,910	4,305	9,605	4,064	4,122	4,465
1983	28,872	15,318	4,467	10,851	3,707	5,035	4,812
1984	27,782	13,945	3,557	10,388	3,772	5,435	4,630

Source: Aerospace Industries Association.
NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," and "Related Products & Services." A comprehensive revision of the AIA aerospace industry sales series for 1967-1984 was completed in 1985 in order to incorporate different data sources and estimating procedures selected to better reflect the evolving composition of the aerospace industry.

SALES OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1968-1984
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1968	$25,592	$16,635	$ 8,957	$ 7,411	$ 6,439	$ 6,076	$ 2,077	$1,040	$ 2,549
1969	24,648	16,560	8,088	7,161	5,603	5,660	2,539	986	2,699
1970	24,752	16,407	8,345	7,586	5,880	5,422	2,324	896	2,644
1971	21,679	14,114	7,565	6,313	5,079	4,971	1,909	884	2,523
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	24,305	14,431	9,874	5,539	6,739	5,580	2,103	1,001	3,343
1974	26,849	15,196	11,653	5,982	7,560	5,854	2,101	1,285	4,067
1975	29,473	17,314	12,159	6,859	7,797	6,310	2,070	1,645	4,792
1976	31,328	19,083	12,245	8,314	7,622	5,880	2,368	1,833	5,311
1977	33,315	20,704	12,611	8,848	7,530	5,775	2,839	2,219	6,104
1978	37,968	21,888	16,080	8,724	10,581	6,380[a]	3,363	2,107[a]	6,813
1979	46,173	23,229	22,944	8,649	16,023	7,197	3,930	2,659	7,715
1980	58,440	26,674	31,766	9,427	20,097	8,393	6,869	2,609	11,045
1981	69,944	33,039	36,905	12,047	21,527	9,722	8,155	3,384	15,109
1982	75,487	42,239	33,248	15,120	16,766	11,980	9,909	4,953	16,759
1983[r]	83,453	49,056	34,397	17,074	18,805	12,745	12,685	2,804	19,340
1984	88,060	54,912	33,148	20,216	17,069	13,655	12,734	2,768	21,618
CONSTANT DOLLARS (1972 = 100)[b]									
1968	$30,144	$19,594	$10,550	$ 8,729	$ 7,584	$ 7,157	$ 2,446	$1,225	$ 3,002
1969	27,914	18,754	9,160	8,110	6,345	6,410	2,875	1,117	3,057
1970	26,529	17,585	8,944	8,131	6,302	5,811	2,491	960	2,834
1971	22,349	14,551	7,799	6,508	5,236	5,125	1,968	911	2,601
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	23,529	13,970	9,559	5,362	6,524	5,402	2,036	969	3,236
1974	23,929	13,544	10,386	5,332	6,738	5,217	1,873	1,145	3,625
1975	23,336	13,709	9,627	5,431	6,173	4,996	1,639	1,302	3,794
1976	22,734	13,848	8,886	6,033	5,531	4,267	1,718	1,330	3,854
1977	22,284	13,849	8,435	5,918	5,037	3,863	1,899	1,484	4,083
1978	22,900	13,201	9,698	5,262	6,382	3,848	2,028	1,271	4,109
1979	25,040	12,597	12,443	4,690	8,689	3,903	2,131	1,442	4,184
1980	28,177	12,861	15,316	4,545	9,690	4,047	3,312	1,258	5,325
1981	30,161	14,247	15,914	5,195	9,283	4,192	3,517	1,459	6,515
1982	29,591	16,558	13,033	5,927	6,572	4,696	3,884	1,942	6,570
1983	30,127	17,710	12,418	6,164	6,789	4,601	4,579	1,012	6,982
1984	29,304	18,274	11,031	6,727	5,680	4,544	4,238	921	7,194

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] AIA estimate based on M37D data.

[b] Based on revised aerospace composite price deflator; detail may not add to totals because of rounding.

[r] Revised.

ORDERS AND BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1968-1984
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
NET NEW ORDERS									
1968	$27,168	$16,577	$10,591	$ 6,418	$ 7,867	$ 6,453	$ 2,115	$1,106	$ 3,209
1969	22,005	14,521	7,484	6,090	5,095	4,864	2,736	873	2,347
1970	21,161	15,116	6,045	6,373	3,469	5,611	2,379	808	2,521
1971	21,553	15,229	6,324	6,621	3,338	5,229	2,155	1,121	3,089
1972	23,842	14,817	9,025	5,760	5,745	6,090	1,853	965	3,429
1973	27,044	15,804	11,240	6,327	6,684	5,978	1,904	1,107	5,044
1974	32,704	19,390	13,314	7,956	8,612	6,827	2,208	1,872	5,229
1975	28,995	18,593	10,402	7,821	6,336	6,082	2,127	2,068	4,561
1976	35,992	21,056	14,936	9,513	8,410	5,751	2,431	3,241	6,646
1977	38,922	22,682	16,240	9,369	11,193	6,232	3,554	2,170	6,404
1978	49,819	25,992	23,827	11,150	16,961	7,072[b]	4,631	2,450[b]	7,555
1979[a]	67,561[a]	28,107	37,101	8,762	30,695	7,609	5,184	4,487	8,471
1980	69,624	33,496	36,128	16,555	18,123	9,818	8,528	4,081	12,519
1981	74,922	42,431	32,491	16,946	17,911	12,376	9,350	3,250	15,089
1982[a]	89,168[a]	58,849[a]	30,319[a]	20,547	13,591	13,988	13,643	4,762	20,369
1983[a]	91,647	60,290	31,357	22,171	16,428	14,248	15,209	2,641	20,950
1984	105,017	67,120	37,897	25,829	21,411	16,558	14,489	3,297	23,433
BACKLOG AS OF DECEMBER 31									
1968	$30,749	$16,343	$14,406	$ 8,150	$12,409	$ 5,083	$ 1,851	$ 983	$ 2,273
1969	28,297	14,298	13,999	7,089	12,099	4,338	2,001	880	1,890
1970	24,705	12,882	11,823	5,913	9,800	4,522	1,986	805	1,679
1971	24,579	13,997	10,582	6,221	8,059	4,780	2,232	1,042	2,245
1972	26,922	15,322	11,600	7,027	8,605	5,272	2,018	972	3,028
1973	29,661	16,695	12,966	7,815	8,550	5,670	1,819	1,078	4,729
1974	35,516	20,889	14,627	9,789	9,602	6,643	1,926	1,665	5,891
1975	35,038	22,168	12,870	10,751	8,141	6,415	1,983	2,088	5,660
1976	39,702	24,141	15,561	11,950	8,929	6,286	2,046	3,496	6,995
1977	45,309	26,119	19,190	12,471	12,592	6,743	2,761	3,447	7,295
1978	57,160	30,223	26,937	14,897	18,972	7,557	4,029	3,668	8,037
1979[a]	78,548[a]	36,136	42,123	17,316	33,168	7,388	5,613	5,112	9,662
1980	89,732	37,199	52,533	17,435	39,800	8,941	8,421	5,127	10,008
1981	94,710	46,591	48,119	21,292	35,022	11,255	9,052	4,940	13,149
1982[a]	108,391[a]	63,201[a]	45,190[a]	26,644	31,920	13,262	13,268	4,269	16,760
1983	116,585	74,435	42,150	30,688	29,684	14,962	18,489	3,684	19,078
1984	133,542	86,643	46,899	36,312	34,015	17,865	20,096	4,361	20,893

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] 1979 and 1982 Orders and Backlog Totals are final revisions for which product group detail is not available.

[b] AIA estimate based on M37D data.

AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1971-1984
(Billions of Dollars)

Year	Gross National Product	Industry Sales			Aerospace Sales As Percent of		
		Manufac-turing	Durable Goods[r]	Aerospace[r]	GNP	Manufac-turing	Durable Goods
CURRENT DOLLARS							
1971	$1,077.6	$ 670.9	$ 359.5	$22.8	2.1%	3.4%	6.3%
1972	1,185.9	756.3	408.3	23.6	2.0	3.1	5.8
1973	1,326.4	875.2	476.2	25.8	1.9	2.9	5.4
1974	1,434.2	1,017.5	530.8	27.5	1.9	2.7	5.2
1975	1,549.2	1,039.1	523.9	29.7	1.9	2.9	5.7
1976	1,718.0	1,185.6	608.4	29.8	1.7	2.5	4.9
1977	1,918.3	1,358.4	711.2	32.2	1.7	2.4	4.5
1978	2,163.9	1,522.9	814.2	37.7	1.7	2.5	4.6
1979	2,417.8	1,727.2	912.7	45.4	1.9	2.6	5.0
1980	2,631.7	1,852.7	930.6	54.7	2.1	3.0	5.9
1981	2,957.8[r]	2,017.5	1,006.5	64.0	2.2	3.2	6.4
1982	3,069.3[r]	1,910.3	922.3	67.8	2.2	3.5	7.4
1983	3,304.8[r]	2,045.3	1,019.4	80.0	2.4	3.9	7.8
1984	3,662.8	2,274.9	1,182.0	83.5	2.3	3.7	7.1

CONSTANT DOLLARS (1972 = 100)[a]					Real Annual Growth[b]			
					GNP	Mfg.	Durs.	Aero.[r]
1971	$1,122.4	$ 698.8	$ 374.4	$23.5	3.4%	0.9%	1.1%	(14.2)%
1972	1,185.9	756.3	408.3	23.6	5.7	8.2	9.1	0.4
1973	1,254.3	827.6	450.3	25.0	5.8	9.4	10.3	5.9
1974	1,246.3	884.2	461.2	24.5	(0.6)	6.8	2.4	(2.0)
1975	1,231.6	826.1	416.5	23.5	(1.2)	(6.6)	(9.7)	(4.1)
1976	1,298.2	895.9	459.7	21.6	5.4	8.4	10.4	(8.1)
1977	1,369.7	969.9	507.8	21.5	5.5	8.3	10.5	(0.5)
1978	1,438.6	541.3	541.3	22.7	5.0	4.4	6.6	5.6
1979	1,479.5	1,056.9	558.5	24.6	2.8	4.4	3.2	8.4
1980	1,475.0	1,038.4	521.6	26.4	(0.3)	(1.8)	(6.6)	7.3
1981[r]	1,512.2	1,031.4	514.6	27.6	2.5	(0.7)	(1.3)	4.5
1982[r]	1,480.0	921.2	444.7	26.6	(2.1)	(10.7)	(13.6)	(3.6)
1983[r]	1,534.7	949.8	473.4	28.9	3.7	3.1	6.5	8.6
1984	1,639.4	1,018.2	529.0	27.8	6.8	7.2	11.7	(3.8)

Source: Gross National Product and GNP Implicit Price Deflator: "Economic Report of the President" (Annually) and "Survey of Current Business" (Monthly). Sales of Manufacturing and Durable Goods Industries: "Survey of Current Business" (Monthly). Aerospace Sales: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

[a] Based on aerospace composite price deflator for aerospace industry sales, and GNP implicit price deflator for other series.

[b] Parentheses indicate negative real annual growth.

[r] Revised.

GROSS NATIONAL PRODUCT, FEDERAL BUDGET AND DEFENSE BUDGET

Fiscal Years 1950-1986
(Billions of Dollars)

Year	Fiscal Year GNP	Federal Budget Outlays		Defense Outlays as Percent of	
		Net Total[a]	Defense[b]	GNP[r]	Federal Budget[r]
1950	$ 265.1[r]	$ 42.6	$ 13.7	5.2%	32.2%
1951	312.8	45.5	23.6	7.5	51.9
1952	339.3	67.7	46.1	13.6	68.1
1953	361.3	76.1	52.8	14.6	69.4
1954	364.2	70.9	49.3	13.5	69.5
1955	380.6	68.5	42.7	11.2	62.3
1956	411.8	70.5	42.5	10.3	60.3
1957	433.9	76.7	45.4	10.5	59.2
1958	443.1	82.6	46.8	10.6	56.7
1959	474.4	92.1	49.0	10.3	53.2
1960	497.9	92.2	48.1	9.7	52.2
1961	509.3	97.8	49.6	9.7	50.7
1962	548.2	106.8	52.3	9.5	49.0
1963	578.0	111.3	53.4	9.2	48.0
1964	618.2	118.6	54.8	8.9	46.2
1965	659.5	118.4	50.6	7.7	42.7
1966	724.1	134.7	58.1	8.0	43.1
1967	777.3	157.6	71.4	9.2	45.3
1968	831.3	178.1	81.9	9.9	46.0
1969	910.6	183.6	82.5	9.1	44.9
1970	968.8	195.7	81.7	8.4	41.7
1971	1,031.5	210.2	78.9	7.6	37.5
1972	1,128.8	230.7	79.2	7.0	34.3
1973	1,252.0	245.6	76.7	6.1	31.2
1974	1,379.4	267.9	79.3	5.8	29.6
1975	1,479.9	324.2	86.5	5.8	26.7
1976	1,640.1	364.5	89.6	5.5	24.6
1977	1,862.8	400.5	97.2	5.2	24.3
1978	2,091.3	448.4	104.5	5.0	23.3
1979	2,357.7	491.0	116.3	4.9	23.7
1980	2,575.8	576.7	134.0	5.2	23.2
1981	2,885.9[r]	657.2	157.5	5.5	24.0
1982	3,046.0[r]	728.4	185.3	6.1	25.4
1983	3,221.4[r]	796.0	209.9	6.5	26.4
1984	3,581.0	841.8	227.4	6.4	27.0
1985[E]	3,868.5	946.6	253.8	6.6	26.8
1986[E]	4,198.5	972.2	285.7	6.8	29.4

Source: "The Budget of the United States Government" (Annually) and Office of Management and Budget, "Federal Government Finances, 1985 Budget Data."

[a] "Net Total" is government-wide total less intragovernmental transactions; excludes off-budget entities.

[b] "Defense" includes the military budget of DOD and other defense-related activities. Beginning in FY 1985, the Federal Budget reflects establishment of a military retirement trust fund. Defense budget data for prior years adjusted for comparable treatment of military retired pay.

E Estimate.

r Revised.

FEDERAL OUTLAYS
DEFENSE, NASA AND AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1986
(Millions of Dollars)

Year	TOTAL National Defense	TOTAL NASA	Federal Outlays for Aerospace Products & Services			Aerospace as Percent of Total National Defense and NASA[r]
			TOTAL	DOD	NASA	
1960	$ 48,130	$ 401	$ 9,646	$ 9,299	$ 347	19.9%
1961	49,601	744	9,516	8,870	646	18.9
1962	52,345	1,257	11,244	10,101	1,143	21.0
1963	53,400	2,552	12,453	10,126	2,327	22.3
1964	54,757	4,171	13,363	9,630	3,733	22.7
1965	50,620	5,093	11,858	7,296	4,561	21.3
1966	58,111	5,933	14,064	8,704	5,360	22.0
1967	71,417	5,426	15,478	10,341	5,137	20.1
1968	81,926	4,724	16,279	11,681	4,598	18.8
1969	82,497	4,251	15,871	11,686	4,185	18.3
1970	81,692	3,753	14,559	10,860	3,699	17.0
1971	78,872	3,382	13,109	9,771	3,338	15.9
1972	79,174	3,422	12,308	8,936	3,372	14.9
1973	76,681	3,315	11,359	8,089	3,270	14.2
1974	79,347	3,256	11,168	7,987	3,181	13.5
1975	86,509	3,266	11,554	8,373	3,181	12.9
1976	89,619	3,669	12,364	8,816	3,548	13.3
Tr. Qtr.	22,269	952	2,855	1,959	926	12.3
1977	97,241	3,945	13,229	9,389	3,840	13.1
1978	104,495	3,983	13,926	10,067	3,859	12.8
1979	116,342	4,196	16,686	12,622	4,064	13.8
1980	133,995	4,852	20,270	15,558	4,712	14.6
1981	157,513	5,426	24,280	19,002	5,278	14.9
1982	185,309[r]	6,035	29,501	23,575	5,926	15.4
1983	209,902[r]	6,664	35,364	28,808	6,556	16.3
1984	227,411	7,048	39,662	32,723	6,939	16.9
1985[E]	253,825	7,317	45,683	38,534	7,149	17.5
1986[E]	285,664	7,772	53,862	46,252	7,610	18.4

Source: "The Budget of the United States Government" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "TOTAL NASA" includes all categories of the NASA budget. NASA construction not included in "Aerospace Products and Services." See additional explanation with following table.

[a] Outlays for aircraft and missile procurement. Does not include RDT&E, which DOD has not reported by product group since 1977, and which, for comparability, has been subtracted from data previously reported in this table for earlier years. Also included are revisions to missile procurement data.

[E] Estimate. Latest year reflects Administration's budget proposal.

[r] Revised.

FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES[r]

Fiscal Years 1960-1986
(Millions of Dollars)

Year	TOTAL[r]	Department of Defense[a]			NASA[b]
		TOTAL	Aircraft	Missiles[c]	
1960	$ 9,646	$ 9,299	$ 6,272	$ 3,027	$ 347
1961	9,516	8,870	5,898	2,972	646
1962	11,244	10,101	6,659	3,442	1,143
1963	12,453	10,126	6,309	3,817	2,327
1964	13,363	9,630	6,053	3,577	3,733
1965	11,858	7,296	5,200	2,096	4,562
1966	14,064	8,704	6,635	2,069	5,360
1967	15,478	10,341	8,411	1,930	5,137
1968	16,279	11,681	9,462	2,219	4,598
1969	15,871	11,686	9,177	2,509	4,185
1970	14,559	10,860	7,948	2,912	3,699
1971	13,109	9,771	6,631	3,140	3,338
1972	12,308	8,936	5,927	3,009	3,372
1973	11,359	8,089	5,066	3,023	3,270
1974	11,168	7,987	5,006	2,981	3,181
1975	11,554	8,373	5,484	2,889	3,181
1976	12,364	8,816	6,520	2,296	3,548
Tr. Qtr.	2,885	1,959	1,557	402	926
1977	13,229	9,389	6,608	2,781	3,840
1978	13,926	10,067	6,971	3,096	3,859
1979	16,686	12,622	8,836	3,786	4,064
1980	20,270	15,558	11,124	4,434	4,712
1981	24,280	19,002	13,193	5,809	5,278
1982	29,501	23,575	16,793	6,782	5,926
1983	35,364	28,808	21,013	7,795	6,556
1984	39,662	32,723	23,196	9,527	6,939
1985[E]	45,683	38,534	27,072	11,462	7,149
1986[E]	53,862	46,252	32,000	14,252	7,610

Source: Department of Defense Budget (Annually); NASA Budget (Annually).

[a] Outlays for aircraft and missile procurement. Does not include RDT&E, which DOD has not reported by product group since 1977, and which, for comparability, has been subtracted from data previously reported in this table for earlier years.

[b] Includes Research & Development, and Research & Program Management, and, effective with 1984 data, Space Flight, Control and Data Communications; excludes Construction of Facilities.

[c] 1978 and subsequent years revised by AIA from previously published data to include Navy Weapons Procurement in Missiles Procurement. Beginning 1978, DOD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement, of which missiles comprise approximately 80 percent.

[E] Estimate. Latest year reflects Administration's budget proposal.

[r] Revised because of DOD data revisions explained in table footnotes.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a]

Fiscal Years 1977-1986
(Millions of Dollars)

	1977	1978	1979
TOTAL[d]	$95,298	$102,348	$113,672
Procurement—TOTAL	$18,178	$19,976	$25,404
Aircraft	6,608	6,971	8,836
Missiles[b]	2,781	3,096	3,786
Ships	2,841	3,048	4,553
Weapons[b]	833	837	1,248
Ammo	940	732	958
Communications & Electronics[c]	1,197	1,349	1,618
Other	2,978	3,942	4,405
Military Personnel—TOTAL	33,672	35,553	37,345
Active Forces	23,857	25,116	26,300
Reserve Forces	1,858	1,959	2,107
Retired Pay	8,216	9,171	10,279
Adjustment: Retirement Trust Fund Accrual[d]	(259)	(694)	(1,341)
Research, Development, Test, & Evaluation	9,795	10,508	11,152
Operations & Maintenance	30,587	33,578	36,424
Military Construction	1,914	1,932	2,080
Family Housing	1,358	1,405	1,468
Other	(206)	(602)	(201)

Source: Department of Defense Budget (Annually) and "Status of Funds" (Annual Summaries).

NOTE: Data in parentheses are credit items. Detail may not add to totals because of rounding.

[a] Includes all items in the DOD military budget; excludes the DOD civil budget for the Army Corps of Engineers and other non-defense-related activities.

[b] Revised by AIA from previously published data to include Navy Weapons Procurement under Missiles Procurement rather than under Weapons Procurement. Beginning in 1978, DOD combined Navy Missiles Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.

[c] Not available as separate item after 1982; included in Other Procurement.

[d] Beginning in FY1985, the Federal Budget reflects establishment of a military retirement trust fund. Data for previous years have been adjusted on a comparable basis.

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE
MILITARY OUTLAYS BY FUNCTIONAL TITLE[a] (Continued)

Fiscal Years 1977-1986
(Millions of Dollars)

1980	1981	1982	1983	1984	1985[E]	1986[E]
$130,976	$153,838	$180,741	$204,429	$220,838	$246,300	$277,500
$ 29,021	$ 35,191	$ 43,271	$53,624	$61,879	$69,706	$83,045
11,124	13,193	16,793	21,013	23,196	27,072	32,000
4,434	5,809	6,782	7,795	9,527	11,462	14,252
4,222	5,218	6,739	7,504	8,487	9,348	10,364
1,249	1,848	2,144	3,420	3,691	3,444	4,009
1,271	1,368	1,647	1,966	1,826	1,218	2,420
1,976	2,399	2,733	} 11,926	} 15,152	} 17,162	} 20,000
4,745	5,355	6,433				
40,897	47,941	55,170	60,886	64,158	67,546	72,798
28,465	33,378	38,522	41,015	42,732	60,145	63,982
2,376	3,031	3,818	4,508	4,923	7,401	8,816
11,920	13,729	14,938	15,945	16,503	(*d*)	(*d*)
(1,864)	(2,197)	(2,109)	(583)	(2)	—	—
13,127	15,278	17,729	20,554	23,117	27,786	33,988
44,770	51,864	59,674	64,915	67,369	74,569	79,648
2,450	2,458	2,922	3,524	3,706	4,209	5,296
1,680	1,721	1,993	2,126	2,413	2,658	2,805
(969)	(614)	(18)	(1,199)	(1,803)	(174)	(79)

FEDERAL PRICE DEFLATORS FOR GNP, DEFENSE, PPI and CPI

1960-1986

Year	GNP		Federal Gov't Defense Purchases		PPI Capital Equip. (CY 1972 = 100)	CPI (Urban) All Items (CY 1972 = 100)
	FY GNP (FY 1972 = 100)	CY GNP (CY 1972 = 100)	Durables (FY 1972 = 100)	Goods & Services (CY 1972 = 100)		
1960	69.57	68.70	73.30	NA	76.7	70.8
1961	70.36	69.33	71.43		76.8	71.5
1962	71.38	70.61	71.39		77.2	72.3
1963	72.57	71.67	77.05		77.3	73.2
1964	73.64	72.77	76.62		78.1	74.1
1965	74.99	74.36	77.45		79.0	75.4
1966	76.98	76.76	78.28		81.0	77.6
1967	79.44	79.06	80.85		83.7	79.8
1968	82.31	82.54	84.11		86.6	83.2
1969	86.18	86.79	86.86		89.5	87.6
1970	91.05	91.45	90.96		93.7	92.8
1971	95.62	96.01	96.63		97.6	96.8
1972	100.00	100.00	100.00	100.0	100.0	100.0
1973	104.45	105.75	102.94	106.6	103.3	106.2
1974	112.06	115.08	106.62	115.1	118.0	117.9
1975	123.27	125.79	112.87	124.9	136.0	128.7
1976	131.89	132.34	123.69	132.4	145.1	136.1
1977	140.77	140.05	135.53	141.9	154.5	144.9
1978	150.33	150.42	146.80	152.7	166.7	155.9
1979	163.46	163.42	162.72	166.0	181.2	173.5
1980	177.63	178.42	181.93	187.5	200.7	197.0
1981	195.35[r]	195.60[r]	203.46[r]	209.1[r]	221.2	217.4
1982	209.35[r]	207.38[r]	224.92[r]	227.0[r]	233.8	230.7
1983	217.59[r]	215.34[r]	240.49[r]	236.6[r]	240.3[r]	238.1
1984[p]	225.88[r]	223.43[r]	255.41[r]	247.2	246.0	248.3
1985[E]	234.04[r]	231.9	265.09[r]	NA	NA	NA
1986[E]	244.23	242.2	275.82	NA	NA	NA

Source: GNP and Defense Purchases from U.S. Department of Commerce, Bureau of Economic Analysis; PPI-Capital Equipment Deflator and CPI Deflator from U.S. Department of Labor, Bureau of Labor Statistics, 1967 = 100, converted to 1972 base year by AIA. Estimates from Economic Assumptions of the Budget of the United States Government (latest year).

r Revised.
p Preliminary.
E Estimate.
NA Not Available

Key:
CY = Calendar Year.
FY = Fiscal Year.
GNP = Gross National Product.
PPI = Producer Price Index for Capital Equipment.
CPI = Consumer Price Index (for all items), for All Urban Consumers for 1978 and subsequent years, and for All Urban Wage Earners for prior years.

FEDERAL PRICE DEFLATORS FOR AEROSPACE INDUSTRY[r]

Calendar Years 1960-1986

Year	Aerospace Deflators (CY 1972 = 100)[a]						
	Composite	SIC 3721	SIC 3724	SIC 3728	SIC 3761	SIC 3764	SIC 3769
1960	75.0	78.3	73.6	78.3	67.6	73.9	71.1
1961	75.2	78.1	74.2	77.9	67.5	74.3	72.6
1962	75.6	78.1	74.6	78.1	69.9	74.8	73.2
1963	75.6	78.0	74.2	78.0	71.7	74.3	72.8
1964	76.0	76.8	76.8	78.5	72.7	77.0	73.2
1965	77.4	78.5	77.6	79.9	73.6	77.7	75.4
1966	79.6	89.2	79.5	82.1	77.0	79.5	77.9
1967	82.4	82.8	81.8	84.3	80.6	82.1	80.3
1968	84.9	85.6	83.4	86.4	84.1	83.5	82.8
1969	88.3	88.9	87.3	89.1	87.3	87.4	86.4
1970	93.3	94.3	92.0	93.7	92.1	92.0	91.3
1971	97.0	98.2	95.5	97.3	95.9	95.5	95.1
1972	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1973	103.3	103.3	103.1	103.8	103.9	103.4	104.3
1974	112.2	107.8	116.8	119.5	111.1	118.1	117.1
1975	126.3	116.0	141.1	140.1	121.5	142.8	137.1
1976	137.8	127.5	153.1	153.4	132.6	155.8	148.5
1977	149.5	140.0	163.7	159.4	147.8	168.6	161.3
1978	165.8	158.3	181.3	173.7	158.9	185.3	177.6
1979	184.4	177.8	200.3	190.7	176.3	204.0	194.9
1980	207.4	199.8	225.1	213.5	200.0	228.9	218.4
1981	231.9	221.5	258.4	236.8	222.2	261.2	245.9
1982	255.1	250.0	279.3	250.6	241.5	283.3	266.7
1983	277.0	274.0	307.3	271.2	251.9	296.6	280.3
1984[p]	300.5	305.0	343.6	297.2	251.4	300.6	284.8
1985[E]	315.3	320.0	361.2	309.8	263.8	315.3	298.7
1986[E]	330.1	335.3	379.3	322.6	276.1	330.0	312.8

Source: U.S. Department of Commerce, Bureau of Economic Analysis and International Trade Administration.

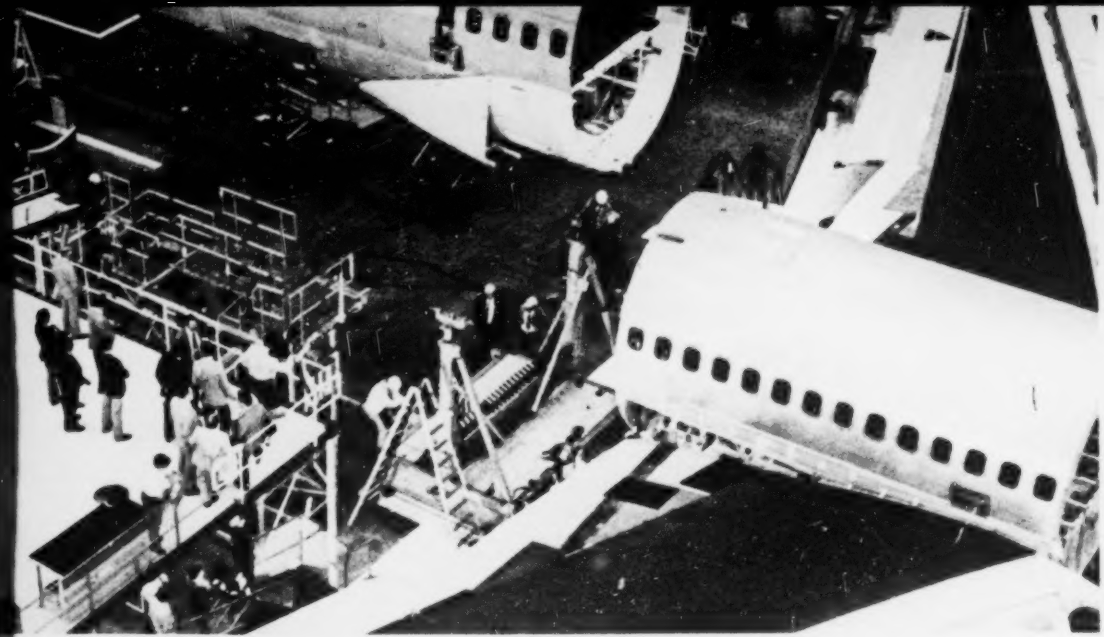
[a] Reported by Dept. of Commerce with 1982 base year; converted by AIA to 1972 base year for comparability with other Federal deflators.

[p] Preliminary

[E] Estimate.

[r] Revised for years since 1972 to reflect recalculation of SIC 3721 deflator for better representation of industry product mix.

Key: SIC = Standard Industrial Classification. SIC 3721 = Aircraft; SIC 3724 = Aircraft Engines and Engine Parts; SIC 3728 = Aircraft Parts; SIC 3761 = Missiles and Space Vehicles; SIC 3764 = Space Populsion; SIC 3769 = Space Equipment not elsewhere classified. Aerospace Composite aggregated by weighting individual SIC categories according to constant dollar value of industry shipments.



AIRCRAFT PRODUCTION

In terms of numbers, U.S. aircraft production declined in 1984—as it has in every year since 1979—but the dollar value increased. The greater value for fewer airplanes is explained by relatively large volume production of high value military aircraft and commercial transports, coupled with continuing decline in sales of lower priced general aviation planes.

Sales of aircraft, engines and parts amounted to $37.3 billion, up from $35.9 billion in 1983; in inflation-adjusted constant dollar terms, this represented a moderate drop. Numerically, the industry produced 2,999 civil and 930 military aircraft for a total of 3,929; the comparable figures for 1983 were 3,356 civil, 1,053 military and 4,409 total aircraft.

Sales to the U.S. government, predominantly the Department of Defense, totaled $20.2 billion, compared with $17.1 billion in the previous year. Sales to customers other than the U.S. government fell sharply below the 1983 level—from $18.8 billion to $17 billion. This was due to reduced sales of commercial transport aircraft, which in recent years has been an area of depressed activity. However, backlog data suggests that the jetliner sales curve bottomed in 1984 and should start a new ascent. During 1984, the civil transport backlog climbed by $4 billion to $16.6 billion; almost $7 billion of the total was in orders from foreign airlines, indicating continuing high levels of export sales in the latter 1980s.

The industry's overall backlog of orders for aircraft, engines and parts jumped significantly—by more than 16 percent—as government orders also increased. At year-end 1984, the total backlog was $70.3 billion, up from $60.4 billion. Once again, as in 1983, the backlog of orders from U.S. government customers topped the non-government backlog, $36.3 billion to $34 billion; the commercial backlog had been higher than the government backlog for the preceding six years.

Among other 1984 aircraft production highlights:

- The industry delivered 185 commercial transports, 77 fewer than in 1983; their total value was $5.7 billion, down from $8 billion in the previous year. At year-end 1984, the industry had orders for 489 transports, a figure that compares with 352 at the end of 1983; it included 167 foreign orders, up from 139 on the books at the end of 1983.
- Total civil aircraft shipments—transports, helicopters and general aviation aircraft—numbered 2,999, the lowest figure in more than 30 years. In addition to the

drop in transport deliveries, there were also declines in helicopter and general aviation production but dollar value increased slightly in each of those categories.

- Civil helicopter production fell off numerically for the fourth straight year, dropping from 403 aircraft in 1983 to 376 in 1984. Helicopter dollar value increased to $330 million (from $303 million in 1983) but that figure was approximately half the sales volume of the peak year 1980.

- The industry delivered 2,438 general aviation planes valued at $1.7 billion; this compares with 2,691 units worth $1.5 billion in the previous year.

- The 930 military aircraft delivered included 555 planes for the U.S. military services and 375 units shipped abroad under Foreign Military Sales programs or commercial contracts with foreign governments. The 555 U.S. aircraft represented a marked reduction from the previous year's 766, in fact the lowest number delivered since the start of the Reagan Administration's defense build-up. The military export figure was 88 units higher than in 1983.

- A breakdown of the U.S. military services' aircraft shows that the Navy took delivery of 215, the USAF 195 and the Army 145. The Navy figure included 94 fighter/attack aircraft, 34 support aircraft, 14 patrol planes and 73 helicopters; the total was 138 fewer than were delivered in 1983. The USAF's 195 planes, 82 fewer than in the previous year, included 169 fighter/attack aircraft, 17 transport/tankers and nine command/control aircraft. The 145 Army acceptances were all helicopters; the figure compares with 136 aircraft in 1983.

SALES OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1968-1984
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1968	$13,850	$ 7,411	$ 6,439	$ 5,697	$ 5,188	$1,714	$1,251
1969	12,764	7,161	5,603	5,382	4,517	1,779	1,086
1970	13,466	7,586	5,880	5,674	4,683	1,912	1,197
1971	11,392	6,313	5,079	4,953	4,093	1,360	986
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973	12,278	5,539	6,739	4,231	5,322	1,308	1,417
1974	13,542	5,982	7,560	4,562	5,846	1,420	1,714
1975	14,656	6,859	7,797	5,269	6,001	1,590	1,796
1976	15,936	8,314	7,622	6,336	5,900	1,978	1,722
1977	16,378	8,848	7,530	6,855	5,670	1,993	1,860
1978	19,305	8,724	10,581	6,853	7,873	1,871	2,708
1979	24,672	8,649	16,023	6,378	12,701	2,271	3,322
1980	29,524	9,427	20,097	6,724	15,901	2,703	4,196
1981	33,574	12,047	21,527	8,197	16,877	3,850	4,650
1982	31,886	15,120	16,766	10,903	12,316	4,217	4,450
1983[r]	35,879	17,074	18,805	12,898	14,419	4,176	4,386
1984	37,285	20,216	17,069	15,136	13,121	5,080	3,948
CONSTANT DOLLARS (1972 = 100)[a]							
1968	$16,313	$ 8,729	$ 7,584	$ 6,710	$ 6,111	$ 2,019	$1,473
1969	14,455	8,110	6,345	6,095	5,116	2,015	1,230
1970	14,433	8,131	6,302	6,081	5,019	2,049	1,283
1971	11,744	6,508	5,236	5,106	4,220	1,402	1,016
1972	10,153	4,954	5,199	3,660	4,085	1,288	1,114
1973	11,886	5,362	6,524	4,096	5,152	1,266	1,372
1974	12,070	5,332	6,738	4,066	5,210	1,266	1,528
1975	11,604	5,431	6,173	4,172	4,751	1,259	1,422
1976	11,565	6,033	5,531	4,598	4,282	1,435	1,250
1977	10,955	5,918	5,037	4,585	3,793	1,333	1,244
1978	11,644	5,262	6,382	4,133	4,749	1,128	1,633
1979	13,380	4,690	8,689	3,459	6,888	1,232	1,802
1980	14,235	4,545	9,690	3,242	7,667	1,303	2,023
1981	14,478	5,195	9,283	3,535	7,278	1,660	2,005
1982	12,499	5,927	6,572	4,274	4,828	1,653	1,744
1983	12,953	6,164	6,789	4,656	5,205	1,508	1,583
1984	12,408	6,727	5,680	5,037	4,366	1,691	1,314

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] Based on revised aerospace composite price deflator; detail may not add to totals because of rounding.

[r] Revised.

ORDERS AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years, 1968-1984
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
NET NEW ORDERS							
1968	$14,285	$ 6,418	$ 7,867	$ 4,973	$ 6,648	$1,445	$1,219
1969	11,185	6,090	5,095	4,650	4,052	1,440	1,043
1970	9,842	6,373	3,469	4,946	2,941	1,427	528
1971	9,959	6,621	3,338	5,166	2,615	1,455	723
1972	11,505	5,760	5,745	4,495	4,317	1,265	1,428
1973	13,011	6,327	6,684	4,838	5,199	1,489	1,485
1974	16,568	7,956	8,612	5,948	6,467[a]	2,008	2,145[a]
1975	14,157	7,821	6,336	6,314	4,758[a]	1,507	1,578[a]
1976	17,923	9,513	8,410	7,498	6,316[a]	2,015	2,094[a]
1977	20,562	9,369	11,193	6,507	8,406	2,862	2,787
1978	28,111	11,150	16,961	9,055	14,229	2,095	2,732
1979	39,457	8,762	30,695	8,762	25,084[a]	2,348	5,611[a]
1980	34,678	16,555	18,123	11,606	14,427	4,949	3,696
1981	34,857	16,946	17,911	11,760	12,621	5,186	5,290
1982[r]	34,138	20,547	13,591	15,978	10,540	4,569	3,051
1983[r]	38,599	22,171	16,428	17,402	11,688	4,769	4,740
1984	47,240	25,829	21,411	19,228	18,286	6,601	3,125
BACKLOG AS OF DECEMBER 31							
1968	$20,559	$ 8,150	$12,409	$ 5,999	$10,609	$2,151	$1,800
1969	19,188	7,089	12,099	5,270	10,340	1,819	1,759
1970	15,713	5,913	9,800	4,663	8,601	1,250	1,199
1971	14,280	6,221	8,059	4,876	7,123	1,345	936
1972	15,632	7,027	8,605	5,705	7,355	1,322	1,250
1973	16,365	7,815	8,550	6,312	7,232	1,503	1,318
1974	19,391	9,789	9,602	7,698	7,791	2,091	1,811
1975	18,892	10,751	8,141	8,743	6,646	2,008	1,495
1976	20,879	11,950	8,929	9,905	7,416	2,045	1,513
1977	25,063	12,471	12,592	9,557	10,152	2,914	2,440
1978	33,869	14,897	18,972	11,759	16,508	3,138	2,464
1979	50,484	17,316	33,168	13,331	27,955	3,985	5,213
1980	57,235	17,435	39,800	12,702	33,258	4,733	6,542
1981	56,314	21,292	35,022	15,626	27,683	5,666	7,339
1982[r]	58,564	26,644	31,920	20,626	25,980	6,018	5,940
1983[r]	60,372	30,688	29,684	24,091	23,377	6,597	6,307
1984	70,327	36,312	34,015	28,183	28,542	8,129	5,473

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] AIA estimate, based on MQ37D data.

[r] Revised.

U.S. AIRCRAFT PRODUCTION—CIVIL

Calendar Years 1969-1984

CIVIL AIRCRAFT

Year	TOTAL	Domestic Shipments			Export Shipments		
		Transports[a]	Helicopters	General Aviation	Transports	Helicopters	General Aviation
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,460[r]	176	570[r]	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617
1982	5,085	111	333	3,326	121	254	940
1983	3,356[r]	133	187[r]	2,172	129	216	519
1984	2,999	102	143	2,013	83	233	425

Source: Civil shipments data from company reports to AIA and General Aviation Manufacturers Association. Export data from Dept. of Commerce (Bureau of Census) Report FT410.

[a] Prior to 1976, includes the C-130 military transport.

[r] Revised.

U.S. AIRCRAFT PRODUCTION—MILITARY

Calendar Years 1969-1984

MILITARY AIRCRAFT

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS[a]	Direct[b]
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,047	625	422	194	228
1981	1,062	703	359	215	144
1982	1,159	690	469	68	401
1983[r]	1,053	766	287	70	217
1984	930	555	375	69	306

Source: Military acceptances for use of U.S. military agencies and for reimbursable programs reported by USAF, USN and Army. Export data from Dept. of Commerce (Bureau of the Census) Report FT 410.

[a] Also includes acceptances of NATO AWACS aircraft.

[b] Military aircraft exported via commercial contracts, directly from manufacturers to foreign governments.

CIVIL AIRCRAFT SHIPMENTS

Calendar Years 1968-1984

Year	TOTAL	Transport Aircraft[a]	Helicopters	General Aviation
NUMBER OF AIRCRAFT SHIPPED				
1968	14,922	702	522	13,698
1969	13,505	414	534	12,457
1970	8,076	311	482	7,283
1971	8,158	223	469	7,466
1972	10,576	227	575	9,774
1973	14,709	294	770	13,645
1974	15,326	332	828	14,166
1975	15,251	315	864	14,072
1976	16,429	222	757	15,450
1977	17,913	155	848	16,910
1978	18,962	241	904	17,817
1979	18,460[r]	376	1,029[r]	17,055
1980	13,634	387	1,366	11,881
1981	10,916	387	1,072	9,457
1982	5,085	232	587	4,266
1983	3,356[r]	262	403[r]	2,691[b]
1984	2,999	185	376	2,438
VALUE—Millions of Dollars				
1968	$ 4,267	$ 3,789	$ 57	$ 421
1969	3,598	2,939	75	584
1970	3,546	3,158	49	339
1971	2,984	2,594	69	321
1972	3,308	2,660	90	558
1973	4,665	3,718	121	826
1974	5,091	3,993	189	909
1975	5,086	3,779	274	1,033
1976	4,592	3,078	285	1,229
1977	4,451	2,649	251	1,551
1978	6,458	4,308	328	1,822
1979	10,644	8,030	403	2,211
1980	13,058	9,895	656	2,507
1981	13,223	9,706	597	2,920
1982	8,610	6,246	365	1,999
1983	9,773[r]	8,000	303[r]	1,470[b]
1984	7,717	5,689	330	1,698

Source: Transport Aircraft and Helicopters: Aerospace Industries Association, company reports.
General Aviation: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the four-engine turboprop-powered Lockheed L-100.

[b] Includes 3 off-the-shelf Gulfstream G-III's delivered to the U.S. Air Force for C-20 VIP transports.

[r] Revised.

CIVIL TRANSPORT AIRCRAFT BACKLOG[a]

As of December 31, 1980-1984

Company and Model	1980	1981	1982	1983	1984
TOTAL AIRCRAFT ON ORDER					
(Domestic and Foreign Orders)	715	526	455	352	489
Value (Millions of Dollars)	$20,799	$17,198	$16,321	$12,591	$16,588
Boeing—TOTAL	535	447	356	273	345
B-727	104	35	19	8	—
B-737	175	146	93	93	170
B-747	71	37	26	22	38
B-757	49	82	80	58	62
B-767	136	147	138	92	75
Lockheed—TOTAL	50	27	11	1	2
L-1011	47	21	7	1	2
L-100	3	6	4	—	—
McDonnell Douglas—TOTAL	130	52	88	78	142
DC-9/MD-80	105	43	85	78	137
DC-10	25	9	3	—	5
TOTAL FOREIGN ORDERS	401	213	196	139	167
Value (Millions of Dollars)	$12,166	$ 7,702	$ 7,322	$ 5,420	$6,941
Boeing—TOTAL	303	180	142	100	120
B-727	48	10	1	—	—
B-737	134	71	45	29	45
B-747	70	37	26	18	38
B-757	22	22	22	16	7
B-767	29	40	48	37	30
Lockheed—TOTAL	32	17	9	1	2
L-1011	29	11	5	1	2
L-100	3	6	4	—	—
McDonnell Douglas—TOTAL	66	16	45	38	45
DC-9/MD-80	46	8	42	38	45
DC-10	20	8	3	—	—

Source: Aerospace Industries Association, company reports.

[a] Unfilled firm orders on the books, excluding options, and new aircraft contracted for lease from manufacturer to customer, for U.S. manufactured transport aircraft over 33,000 lbs. including all jet transports plus the turboprop-powered Lockheed L-100.

SHIPMENTS OF CIVIL TRANSPORT AIRCRAFT[a]

Calendar Years 1980-1984

Company and Model	1980	1981	1982	1983	1984
TOTAL					
Number of Aircraft Shipped	387	387	232	262	185
Value (Millions of Dollars)	$9,895	$9,706	$6,246	$8,000	$5,689
Boeing—TOTAL	296	255	169	196	138
B-707	—	—	1	—	—
B-727	131	94	26	11	8
B-737	92	108	95	82	67
B-747	73	53	25	23	16
B-757	—	—	2	25	18
B-767	—	—	20	55	29
Lockheed—TOTAL	26	36	17	11	7
L-1011	24	28	14	6	4
L-100	2	8	3	5	3
McDonnell Douglas—TOTAL	65	96	46	55	40
DC-9/MD-80	25	77	41	51	38
DC-10	40	19	5	4	2

Source: Aerospace Industries Association, company reports.

[a] U.S.-manufactured fixed-wing aircraft over 33,000 lbs. empty weight; all are jet-powered except the four-engine turboprop-powered Lockheed L-100.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT[a]

On Order or In Production as of 1984

Number of Engines and Crew, and Model Designation[b]	Initial Service	Standard Mixed Class	Operating Empty Weight (000's lbs)	Maximum Takeoff Gross Weight (000's lbs)	Range (Nautical Miles)[c]	Engines (Manufacturer[d] and Model)
FOUR ENGINES/CREW OF 3						
747-200*	1971	452	379	775-833	5,350	P&W JT9D-7AW
747SP*	1976	331	325	700	6,100	P&W JT9D-7AW
747-300 (EUD)*	1983	496	388	775-785	5,500	P&W JT9D-7AW
THREE ENGINES/CREW OF 3						
727-200	1972	143	98	186-191	2,100	P&W JT8D-9A/15/17/17R
L-1011-100*	1975	304	246	466	3,460-3,705	RR RB211-22B
L-1011-500*	1979	242	246	496-504	5,040-5,225	RR RB211-524B4
DC-10-10*	1971	250	245	440	3,750	GE CF6-6D
DC-10-15*	1981	278	247	455	3,800-4,000	GE CF6-50C2-F
DC-10-30*	1972	275	271	580	5,470	GE CF6-50C2
DC-10-40*	1972	275	273	580	5,300	P&W JT9D-59A
TWO ENGINES/CREW OF 2						
737-200	1971	110	61	116-119	1,800	P&W JT8D-9A/15/17/17R
737-300	1984	128	72	125-136	2,300	CFMI-CFM56-3
757-200	1982	186	128-130	220-240	2,300-3,800	RR RB211-535C/E4 or P&W 2037
767-200*	1982	216	178-179	282-310	3,650	P&W JT9D-7R4 or GE CF6-80A
767-200ER*	1984	216	189-190	351	5,300	P&W JT9D-7R4 or GE CF6-80A
767-300*	1986	261	189-190	351	3,650	P&W JT9D-7R4 or GE CF6-80A
MD-80:						
MD-81	1980	142	78	140	1,700	P&W JT8D-209
MD-82	1981	142	78	149	2,080	P&W JT8D-217A
MD-83	1985	142	80	160	2,590	P&W JT8D-219

Source: Aerospace Industries Association, based on company reports.

[a] All jet-powered passenger transport aircraft 33,000 pounds or more empty weight.

[b] Manufacturers are The Boeing Company (727, 737, 747, 757, and 767), Lockheed Corporation (L-1011), and McDonnell Douglas Corporation (MD-80 and DC-10).

[c] Full passenger load and baggage.

[d] P&W = Pratt and Whitney Aircraft Company of United Technologies Corporation; GE = General Electric Company; RR = Rolls-Royce Limited; CFMI = General Electric/Snecma.

* Wide-body aircraft.

SPECIFICATIONS OF U.S. CIVIL HELICOPTERS

In Production as of 1984

Company	Commercial Model	Number of Places	Useful load (Lbs.)	Range with Useful Load (N. Miles)	External Cargo Payload (Lbs.)
Bell Helicopter Textron Textron Inc.	206 Series	4-5	1315-1630	240-304	1200-1500
	206L Series	7	1894-1931	297-308	2000
	212	15	5238	226	5000
	214 Series	16-18	5450-8035	219-435	6000-8000
	222	7-10	2985	356	2500
	412	15	5333	232	5000
Boeing Vertol Company	234 (LR)	47	23,300	620	28,000
	234 (UT)	3	30,000	264	28,000
The Enstrom Helicopter Corp.	F-28 Series	3	700-850	238-272	500-1000
	280 Series	3	700-850	243-272	500-1000
Hiller Helicopters Rogerson Aircraft Corp.	12-E Series	3-4	1264-1341	215	1000
	12-ET Series	3-4	1450	351	1000
	RH-1100	5	1355	396	1500
Hynes Helicopter, Inc.	B-2B	2	670	225	400
	305	5	1200	275	800
McDonnell Douglas Helicopter Co.[b]	300 Series[a]	3	698-1004	191-224	1104
	500 Series	4-7	1320-1660	276-287	1560-2000
Robinson Helicopter Co.	R22	2	468	208	—
Schweizer Aircraft Corp.	300C[a]	3	698-1004	191-224	1104
Sikorsky Aircraft Div. United Technologies Corp.	S-76 (MARK II)	14	4525	466	4200
	S-70C Commercial Utility	19	11,862	297	8000

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83" and "AIA Directory of VTOL Aircraft, 1983."

[a] In 1983, Schweizer Aircraft became the licensed manufacturer for the Hughes 300C, redesignated the Schweizer-Hughes 300C, with product support beginning in 1983, and production beginning in 1984.

[b] McDonnell Douglas Corporation acquired Hughes Helicopters in January 1984.

CIVIL HELICOPTER SHIPMENTS[a]

Calendar Years 1980-1984

Company and Model	1980	1981	1982	1983	1984
CIVIL SHIPMENTS	1,366	1,072	587	403[r]	376
Value (Millions of Dollars)	$ 656	$ 597	$365	$303[r]	$330
Bell—TOTAL	740	609	272	159	151
205	26	—	—	—	—
206 series	550	476	193	107	94
212	116	49	32	6	18
214 series	7	12	10	11	13
222	41	21	15	17	26
412	—	51	22	18	—
Boeing Vertol—TOTAL	—	5	1	4[r]	—
234	—	5	1	4[r]	—
Enstrom-TOTAL	48	46	24	9	5
F-28 series	18	29	17	8	2
280 series	30	17	7	1	3
Hiller—TOTAL	45	30	12	7	—
12-E series	41	23	6	6	—
12-ET series	4	6	3	1	—
FH/H-1100	—	1	3	—	—
Hughes—TOTAL	365	184	162	137	92
300 series	136	50	54	67	(b)
500 series	229	134	108	70	85
530 series	—	—	—	—	7
Robinson—TOTAL	78	156	88	64	79
R22	78	156	88	64	79
Schweizer—TOTAL	—	—	—	—	11
300C[b]	—	—	—	—	11
Sikorsky (UTC)—TOTAL	90	42	28	23	38
S-61	5	—	—	—	—
S-76	85	42	28	23	27
S-70A	—	—	—	—	2
S-70C-2	—	—	—	—	9

Source: Aerospace Industries Association, company reports.

NOTE: All data exclude production by foreign licensees.

[a] Domestic and export helicopter shipments for non-military use. The data in this table have been revised to separate out direct military exports (involving commercial contracts between U.S. manufacturers and foreign governments) which are now reported elsewhere in this chapter. Models which may be shipped in either a civil or a military configuration appear in both tables.

[b] Beginning with 1984 production, Schweizer Aircraft became the licensed manufacturer for the Hughes 300C, redesignated the Schweizer-Hughes 300C.

[r] Revised to include first-time manufacturer-to-customer leases of two Boeing Vertol 234's.

DIRECT EXPORT SHIPMENTS OF MILITARY HELICOPTERS[a]

Calendar Years 1980-1984

Model	1980	1981	1982	1983	1984
DIRECT MILITARY EXPORT SHIPMENTS	86	33	42	54	31
Value (Millions of Dollars)	$98	$186	$77	$90	$59
Bell 205	4	—	—	—	—
Bell AH-1S	1	—	—	15	—
Bell UH-1H	35	—	—	—	—
Boeing Vertol CH-47/414/352	6	23	8	—	3
Hiller 12-E	—	—	20	—	—
Hiller 12-ET	4	—	—	—	—
Hughes 500MD (TOW)/ 500 Scout	36	2	14	26	24
Sikorsky S-76	—	8	—	13	4

Source: Aerospace Industries Association, company reports.

[a] Shipments of helicopters in military configuration exported directly from U.S. manufacturers to foreign governments. Military helicopters exported via Foreign Military Sales (FMS) are reported with Dept. of Defense (DOD) aircraft acceptance data elsewhere in this chapter. Some models reported on this page may be shipped in either military or civil configuration; see Civil Helicopter Shipments table for additional data.

GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers
Calendar Years 1980-1984

	1980	1981	1982	1983	1984
NUMBER OF AIRCRAFT SHIPPED	11,881	9,457	4,266	2,691[b]	2,438
Agricultural	357	340	174	1,811	1,621
Single-Engine, Piston	8,283	6,268	2,697		
Multi-Engine, Piston	2,116	1,542	678	417	374
Turboprop	795	918	458	321	272
Turbojet	330	389	259	142[b]	171
VALUE OF SHIPMENTS[a] (Millions of Dollars)	$ 2,507	$2,920	$1.999	$1,470[b]	$1,698
Agricultural	$ 25	$ 24	$ 199	$ 145	$ 149
Single-Engine, Piston	365	315			
Multi-Engine, Piston	402	389	220	115	135
Turboprop	874	1,017	590	460	443
Turbojet	841	1,175	990	750[b]	971
Number of Aircraft By Selected Manufacturer					
Ayres	44	59	25	9[c]	(c)
Beech	1,394	1,242	526	402	411
Bellanca	103	—	—	—	—
Cessna	6,393	4,680	2,140	1,219	978
Fairchild	86	85	49	39	29
Gates Learjet	120	138	99	45	33
Gulfstream	167	284	96	71[b]	58
Lake	79	52	22	28	26
Lockheed Jetstar	4	—	—	—	—
Maule	59	44	39	36	65
Mooney	332	330	188	154	151
Piper	2,954	2,495	1,048	661	664
Rockwell International	146	40	—	—	—
Schweizer Aircraft	—	8	34	27	23

Source: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] Manufacturers' net billing price.

[b] Includes 3 off-the-shelf Gulfstream G-3's delivered to the U.S. Air Force for C-20 VIP transports.

[c] Data not reported after August 1983.

MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES

Number and Flyaway Value
Calendar Years 1968-1984

Year	TOTAL	Bomber/ Patrol/ Command/ Control	Fighter/ Attack	Trans-port/ Tanker	Trainer	Heli-copter	Other
NUMBER							
1968	4,440	34	1,007	18	292	2,800	289
1969	3,644	31	792	44	295	2,165	317
1970	3,085	66	734	37	173	1,944	131
1971	2,232	48	386	42	135	1,587	34
1972	2,117	13	563	29	148	1,312	52
1973	1,372	30	422	22	90	808	—
1974	1,110	50	478	27	49	506	—
1975	1,369	62	624	34	40	601	8
1976	1,143	55	646	67	11	348	16
1977	862	44	488	25	12	273	20
1978	723	30	478	28	—	166	21
1979	734	17	529	16	—	158	14
1980	819	16	551	15	18	189	30
1981	918	19	649	17	60	158	15
1982	758	26	478	14	60	172	8
1983[r]	836	34	421	22	120	233	6
1984	624	36	299	15	30	238	6
FLYAWAY VALUE—Millions of Dollars							
1968	$3,871	$117	$2,451	$ 81	$167	$905	$150
1969	3,693	248	2,204	101	164	845	131
1970	3,920	545	1,940	555	111	694	75
1971	2,996	397	1,322	688	112	469	8
1972	3,247	129	2,068	536	100	396	18
1973	2,571	325	1,490	348	140	268	—
1974	2,224	584	1,222	101	111	206	—
1975	3,172	599	2,054	128	27	359	5
1976	4,729	547	3,421	340	27	384	10
1977	4,364	499	3,190	331	14	316	14
1978	4,664	689	3,496	237	—	225	17
1979	5,470	442	4,660	136	—	219	13
1980	6,514	475	5,282	178	32	516	31
1981	8,446	526	6,518	509	32	825	19
1982	8,605	886	6,383	410	42	872	12
1983[r]	9,640	1,259	6,708	575	79	1,009	10
1984	9,292	1,274	5,695	567	18	1,726	12

Source: Departments of the Army, Navy, and Air Force.

NOTE: Data represent new U.S.-manufactured aircraft, excluding gliders and targets. Values include spares, spare parts, and support equipment that are procured with the aircraft. Effective 1972, includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales. 1972-1975, flyaway value does not include the value of planes produced for the security assistance programs and accepted by the USAF.

[r] Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES AIR FORCE[a]

Calendar Years 1983 and 1984
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1983	1984	1983	1984	1983	1984
AIR FORCE—TOTAL	277	195	$3,742	$3,380	$4,537	$4,263
Fighter/Attack—TOTAL	241	169	2,871	2,614	3,537	3,296
A-7K	4	—	58	—	69	—
A-10A	35	4	333	42	376	46
F-15	40	42	915	1,064	981	1,385
F-16	162	123	1,565	1,508	2,111	1,865
Transports/Tankers—TOTAL	18	17	513	510	521	546
C-130H	11	3	145	40	148	48
KC-10A	7	8	368	458	373	486
C-12D	—	6	—	12	—	12
Command/Control—TOTAL	7	9	304	256	425	421
E-3A	3	2	229	141	343	216
TR-1A	4	7	75	115	82	205
Helicopters—TOTAL	11	—	54	—	54	—
UH-60A	11	—	54	—	54	—

Source: Department of the Air Force.

NOTE: Costs shown are approximate. Calendar year acceptances may derive from procurement quantities funded in more than one fiscal year.

[a] Air Force acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment and non-recurring costs associated with the manufacture of the aircraft.

[c] Weapon System Cost includes flyaway costs, peculiar ground equipment, training equipment and technical data.

[d] Excludes 3 C-20's (off-the-shelf Gulfstream G-3's) delivered to the Air Force (for VIP transport) and included in civil general aviation shipments.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES ARMY[a]

Calendar Years 1983 and 1984
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1983	1984	1983	1984	1983	1984
ARMY—TOTAL	136	145	$607	$795	$702[r]	NA
Helicopters—TOTAL	130	145	597	795	692[r]	NA
AH-1S	4	6	11	24	12	27
UH-60A	126	123	586	629	680[r]	663
AH-64	—	16	—	142	—	NA
Fixed-Wing—TOTAL	6	—	10	—	10	—
C-12	6	—	10	—	10	—

Source: Department of the Army.

[a] Army acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.

[c] Weapon System Cost includes flyaway items, initial spares, ground equipment, training equipment and other support items.

[r] Revised.

NA Not available.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES NAVY[a]

Calendar Years 1983 and 1984
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1983	1984	1983	1984	1983	1984
NAVY—TOTAL	353[r]	215	$4,003[r]	$4,045	$5,179[r]	$NA
Patrol—TOTAL	18	14	$ 515	$ 457	$ 667	$ 688
P-3C	12	8	317[r]	243	418[r]	364
E-2C	6[r]	6	198[r]	214	249[r]	324
Fighter/Attack—TOTAL	119	94	2,989	2,631	3,892	3,548
F-14A	30	26	877	778	1,117	1,044
F/A-18	68	39	1,693	960	2,211[r]	1,328
AV-8B	—	12	—	503	—	612
A-6E	15	11	262	219	340	279
EA-6B	6	6	157	171	224	285
Helicopters—TOTAL	92	73	358	870	468	1,305
CH-53E	20	18	254	255	322	356
TH-57	69	21	43	13	57	31
SH-60B[d]	2[r]	22	53[r]	505	79[r]	798
SH-2F[d]	1[r]	12	8[r]	97	10[r]	120
Support—TOTAL	124	34	141	87	152	NA
T-34	120	30	79	18	88	26
EC-130	—	2	—	27	—	NA
KC-130T	4[r]	2	62[r]	42	64[r]	42

Source: Department of the Navy.

[a] Navy acceptances for own use; excludes FMS shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, non-recurring costs and ancillary equipment.

[c] Weapon System Cost (Investment Cost) includes flyaway items, initial spares, ground equipment, training equipment and other support items.

[d] Aircraft acceptances in CY83 and CY84 were for first production lot of 18 aircraft plus first 6 of second production lot; cost figures therefore are not representative of full-rate production costs.

[r] Revised.

NA Not available.

MILITARY AIRCRAFT ACCEPTANCES FOR REIMBURSABLE PROGRAMS[a]

Calendar Years 1983 and 1984
(Millions of Dollars)

Accepting Agency, Type and Model	Number of Aircraft Accepted		Flyaway Cost[b]	
	1983	1984	1983	1984
TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS	70	69	$1,288	$1,072
AIR FORCE—TOTAL	66[r]	41	$1,232[r]	$ 821
Fighter/Attack—TOTAL	61[r]	36	848	450
F-5E	4	10	30	115
F-5F	6	6	43	56
F-15	18	—	351	—
F-16	33[r]	20	424[r]	279
Command/Control—TOTAL	5	5	384	371
E-3A (NATO AWACS)	5	5	384	371
NAVY—TOTAL	4	8	56	$ 190
Patrol—TOTAL	4	8	56	190
P-3C	4	4	56	60
E-2C	—	4	—	130
ARMY—TOTAL	—	20	—	$ 61
Helicopters—TOTAL	—	20	—	61
UH-1H	—	10	—	18
AH-1S	—	10	—	43

Source: Departments of the Air Force, Navy, and Army.

[a] Foreign Military Sales and NATO AWACS Program.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament, other installed equipment and nonrecurring costs associated with the manufacture of the aircraft.

[r] Revised.

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a]

Fiscal Years 1984, 1985 and 1986
(Millions of Dollars)

Agency, Type and Model	1984		1985[E]		1986[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
B-1B	10	$6,124.5	34	$7,630.7	48	$5,624.0
C-5B Galaxy	4	1,358.3	8	1,652.4	16	2,380.6
C-130H Hercules[f]	10	172.0	16	300.0	—	—
European Distribution System Aircraft (EDSA)	16	49.6	—	—	—	—
F-15 C/D/E Eagle	36	1,514.5	42	2,066.2	48	2,224.4
F-16 Falcon	144	2,551.7	150	3,306.5	180	3,693.4
KC-10A ATCA Extender	8	786.1	8	619.9	12	519.0
KC-135 Re-engining/Modern	19	548.2	43	715.1	43	727.4
TR-1/U-2[b]	6	218.3	4	247.9	8	455.2
C-20A (C-SAM)	—	—	3	57.6	8	185.6
LANTIRN (Night Precision Attack)	—	—	—	90.0	10	436.4
PLSS (Precision Location Strike System)	—	8.8	—	92.2	—	112.8
Fight Inspection Aircraft	—	—	1	23.0	—	—
MC-130H Combat Talon[f]	2	73.1	2	95.4	1	83.3
CRAF Mods.	3	95.9	4	128.9	5	164.9
T-46A Next Generation Trainer	—	9.2	10	131.3	33	222.2
C-12D	6	11.8	6	15.0	—	—
Range Control Aircraft	—	—	2	16.4	—	—
ARMY						
AH-64 Attack Helicopter	112	$1,360.4	144	$1,418.8	144	$1,376.3
C-12	6	11.7	12	24.0	—	—
RC-12D Guardrail	—	33.8	9	90.2	—	—
CH-47 Modernization	36	357.9	48	482.9	48	396.6
UH-60A Blackhawk[d]	84	431.5	88	494.7	82	608.3
EH-60A Quick Fix	12	160.5	18	130.4	18	160.4
OH-58D AHIP Modification	16	199.5	44	231.1	56	260.6
NAVY						
A-6E/F Intruder	6	$ 232.0	6	$ 256.7	6	$ 224.0
AV-8B	27	893.1	32	870.3	46	1,076.6
C-2 Greyhound	6	201.7	8	198.1	8	174.5
C-9B Skytrain II	—	—	(c)	40.0	—	—
Super Stallion CH/MH-53E	11	196.0	10	260.8	14	318.1
E-2C Hawkeye	6	324.2	6	357.0	6	390.3
EA-6B Prowler	8	488.3	6	398.2	12	501.6
F-14A/D Tomcat	24	976.0	24	964.2	18	812.4
FA-18 Hornet	84	2,472.3	84	2,588.2	84	2,849.7

(Continued on next page)

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a] (Continued)

Agency, Type and Model	1984		1985[E]		1986[E]	
	No.	Cost	No.	Cost	No.	Cost
NAVY (Continued)						
KC-130T Hercules[f]	2	47.6	2	48.0	—	—
P-3C Orion	5	303.9	9	413.1	9	496.5
SH-60B Seahawk LAMPS	21	527.6	24	476.7	18	378.8
SH-60F CVASW	—	—	—	—	—	30.0
SH-2F Seasprite (LAMPS MK-I)	6	55.8	6	66.3	6	71.3
T-34C Mentor	—	4.8	—	—	38	49.4
TH-57 Sea Ranger	21	29.7	36	24.4	—	—
AH-1T Sea Cobra	—	17.8	22	206.6	22	218.5
F-16E Adversary Aircraft	4	31.9	10	123.1	12	130.5
E-6A (ECX)	—	97.7	—	—	2	400.2
UC-12B/CX	—	—	12	26.9	12	26.9
VH-60[d]	—	—	—	26.9	9	127.9

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget. (Annually).
NOTE: See Research and Development Chapter for aircraft program RDT&E authorization data.
a Total Obligational Authority for procurement, including initial spares.
b Includes ground stations.
c Quantity to be determined.
d Army, Navy and Air Force funding.
E Estimate. Latest year reflects Administration's budget proposal.
f Navy and Air Force funding.

ACTIVE U.S. MILITARY AIRCRAFT IN CONTINENTAL U.S. [a]

Fiscal Years 1976-1986

Fiscal Year	Total	Fixed Wing Aircraft				Helicopter
		Total	Jet	Turboprop	Piston	
1976	19,775	12,126	9,255	1,511	1,360	7,649
1977	18,670	11,625	9,168	1,382	1,075	7,045
1978	18,931	11,748	8,898	1,794	1,056	7,183
1979	18,526	11,365	8,656	1,859	850	7,161
1980	18,969	11,362	8,794	1,869	699	7,607
1981	19,363	11,645	9,111	1,943	591	7,718
1982	21,728	12,063	9,647	1,900	516	9,665
1983	18,652	11,603	9,495	1,745	363	7,049
1984[p]	18,833	11,661	9,551	1,777	333	7,172
1985[E]	19,047	11,787	9,657	1,800	330	7,260
1986[E]	19,224	11,904	9,755	1,826	323	7,320

Source: Department of Defense, Office of the Secretary of Defense, reported in "FAA Aviation Forecasts" (Annually).
a Includes Army, Air Force, Navy, and Marine regular service aircraft, as well as Reserve and National Guard aircraft.
p Preliminary.
E Estimate.

DEPARTMENT OF DEFENSE OUTLAYS FOR AIRCRAFT PROCUREMENT

By Agency
Fiscal Years 1960-1986
(Millions of Dollars)

Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1960	$ 6,272	$ 4,414	$1,765	$ 93
1961	5,898	3,926	1,832	140
1962	6,659	4,387	2,102	170
1963	6,309	3,747	2,328	234
1964	6,053	3,894	1,859	300
1965	5,200	3,115	1,739	346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr. Qtr.	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	787[r]
1981	13,193	7,941	4,397	855
1982	16,793	9,624	5,872	1,297
1983	21,013	11,799	7,490	1,724
1984	23,196	12,992	8,040	2,165
1985[E]	27,072	15,318	9,015	2,740
1986[E]	32,000	18,323	10,374	3,303

Source: Department of Defense Budget (Annually).
NOTE: Detail may not add to totals because of rounding.
[E] Estimate. Latest year reflects Administration's budget proposal.
[r] Revised.

SPECIFICATIONS OF U.S. MILITARY AIRCRAFT ON ORDER OR IN PRODUCTION AS OF 1983

Primary Mission, DOD Designation, & Popular Name	Manufacturer	U.S. Military Service	Crew	Empty Weight (000's lbs)	Engines	Performance Typical for Primary Mission	Remarks
ATTACK							
A-6E Intruder	Grumman	USN/USMC	2	27	2 × P&W J52	Mach 8 sea level	Also EA-6A/B & KA–6D
A-7K Corsair 2	LTV Aero	ANG	2	21	1 × All TF 41	Subsonic	Trainer; combat capable
AV-8B Harrier 2	MDC/Br.Aer.	USMC	1	13	1 × RR F402	Mach 9 +	Graphite epoxy super-critical wing
A-10A Thunderbolt 2	Fairchild	USAF	1	22	2 × GE TF34	Max. speed 400kt	Close air support
BOMBERS							
B-1B	Rockwell	USAF	4	182	4 × GE F101	High subsonic penetration	Intercont'l range, unrefueled
ELECTRONIC WARFARE							
EA-6B Prowler	Grumman	USN/USMC	4	33	2 × P&W J52	493n.m. standoff radius	Tactical jamming system
FIGHTERS							
F-5E Tiger 2	Northrop	USAF/USN	1	10	2 × GE J85	Mach 1.6 class	More than 1,200 F-5E/Fs delivered
F-5F Tiger 2	Northrop	USAF/USN	2	11	2 × GE J85	Mach 1.5 class	2-seat trainer fighter
F-14A Tomcat	Grumman	USN	2	40	2 × P&W TF30	Mach 2.3 class	Missile, gun fleet defense
F-15C Eagle	MDC	USAF	1	29	2 × P&W F100	Mach 2.5 class	Air superiority, defense, guns missiles; 15D = 2 seat trainer
F-16 Fighting Falcon	GD	USAF	1-2	15	1 × P&W F100	Mach 2 + class	Multirole fighter; fully fly-by-wire; missiles, guns
F/A-18 Hornet	MDC/Northrop	USN/USMC	1	24	2 × GE F404	Mach 1.8 +	Missiles, guns; also export
F-20 Tigershark	Northrop	Export	1	12	1 × GE F404	Mach 2 class	Multirole; adv. avionics
RECONNAISSANCE							
TR-1/U-2	Lockheed	USAF	1	18	1 × P&W J75	Altitudes 70,000 ft +	High alt. tactical recon.
PATROL/ANTI-SUBMARINE WARFARE							
P-3C Orion	Lockheed	USN	10	67	4 × All T56	14 + hr. mission duration	Torpedoes, missiles, sono-buoys, mines; also export
EARLY-WARNING							
E-2C Hawkeye	Grumman	USN	5	38	2 × All T56	6 hr. mission duration	AEW command & control; passive detection
E-3A AWACS	Boeing	USAF/NATO	17	188	4 × P&W TF33	Long range, subsonic	Surveillance radar, command, control
CARGO-TRANSPORT							
C-2A Greyhound	Grumman	USN	2	34	2 × All T56	Cruise 260kt; 1,560n.m. range	First Navy multi-year procurement contract
C/KC-130 Hercules	Lockheed	USAF, USN, Export	4	74-78	4 × All T56	Cruise 360mph; 2,046n.m. range	92-128 troops or 39-43 thsnd. lbs.
C-5B Galaxy	Lockheed	USAF	5	351	4 × GE TF39	Cruise 560mph; 2,370n.m. range	Global strategic logistics; 208,000 lb. cargo capacity
C-9B Skytrain 2	MDC	USN	5-7	65	2 × P&W JT8D	Cruise 570mph; 3,300n.m. range	90 pass. or 34,444 lb. cargo
C-12 Huron	Beech	Army/USAF	2	8	2 × PWC PT6A	Cruise 259kt. at 14,000ft	10-place; pass. or cargo
KC-10A Extender	MDC	USAF	5	241	3 × GE CF6	600 + mph.	Tanker or cargo
C-20A G3	Gulfstream	USAF	2	32	2 × RR Spey	Mach.77; 3,650 n.m.	VIP transport; 14 pass.
TRAINING							
T-34C Turbo Mentor	Beech	USN	2	3	1 × PWC PT6A	Cruise 211kt. at 17,500ft	Simulates jet a/c, weapons
HELICOPTERS							
AH-1T Sea Cobra	Bell-Textron	USN	2	9	2 × PWC T400	Max 195 mph; 360 mi.	TOW w/20 mm gun
AH-1S Cobra	Bell-Textron	Army	2	6	1 × Lyc T53	Max 195 mph; 380 mi.	TOW w/mini gun
AH-64 Apache	Hughes-MDC	Army	2	11	2 × GE T700	Max 189 mph; 372 mi.	Attack helicopter
CH-53E Super Stallion	Sikorsky-UTC	USN	3	32	3 × GE T64	Max 196 mph; 710 mi.	55 passengers, aux. tanks
SH-2F Seasprite	Kaman	USN	3	7	2 × GE T58	Max 165 mph; 425 mi.	LAMPS Mk.I helicopter
TH-57A Sea Ranger	Bell-Textron	USN	2	2	1 × All 250	Max 140 mph; 400 mi.	Primary trainer
SH-60B Seahawk	Sikorsky-UTC	USN	3	14	2 × GE T700	Max 171 mph	ASW
UH-1H	Iroquois	Army	2	5	1 × Lyc. T53	Max 127 mph; 286 mi.	Succeeds UH-1D
UH-60A Black Hawk	Sikorsky-UTC	Army/USAF	3	11	2 × GE T700	Max 184 mph; 389 mi.	UTTAS

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."

CODE
Manufacturers: MDC = McDonnell Douglas; Br.Aer. = British Aerospace; GD = General Dynamics.
U.S. Military Service: USN = Navy; USMC = Marine Corps; USAF = Air Force; ANG = Air National Guard.
Engines: P&W = Pratt & Whitney; PWC = Pratt & Whitney of Canada; All = Detroit Diesel Allison Div. of General Motors; Lyc = Avco Lycoming; RR = Rolls Royce.

MISSILE PROGRAMS

Industry production of missile systems increased in 1984, continuing the growth trend that began in 1978, but the increase was of moderate order. Data compiled by Aerospace Industries Association shows missile sales, including propulsion systems and research and development contracts, of $11.3 billion, up from $10.3 billion in 1983; in inflation-adjusted constant dollar terms, the gain was negligible. According to Bureau of the Census reports, sales of missile systems and parts, *excluding* propulsion and R&D work, reached a record level of $6.1 billion, but that was only $100 million higher than in the previous year and in constant dollars it was actually a slight decline.

The aerospace industry received new orders for missile systems totaling $7.7 billion in 1984 and the missile backlog increased substantially, from $8.4 billion at the end of 1983 to $10 billion at year-end 1984.

Under Department of Defense plans, missile production would increase at a more rapid pace. DoD requested $14.3 billion for missile procurement in the FY 1986 budget, an increase of more than 24 percent over the previous year. However, that figure was cut sharply during Congressional deliberations on the budget; an exact figure for FY 1986 missile funding was not available, since final action was pending at publication time.

DoD's largest missile program is the Air Force's 10-warhead Peacekeeper intercontinental ballistic missile. The Administration had planned to build and deploy 100 of the weapons, the first 21 of which are in production; funding for another 48 was requested. However, in 1985 actions, Congress reduced the 48 requested missiles to 12 and cut the total program to 50 missiles. Initial operational Peacekeeper service is targeted for 1987, but that could be postponed in light of Congressional actions.

On the basis of DoD's procurement plans, missile programs with the highest FY 1986 dollar value—other than Peacekeeper—are the Army's Patriot long range air defense missile system ($1.1 billion); the Navy's Standard shipboard air defense system ($874 million); the Navy's Tomahawk cruise missile, capable of being deployed from air, surface ship, submarine and land platforms ($780 million); and the Navy's HARM (High Speed Anti-Radiation Missile), an air-to-surface weapon designed to destroy enemy land-based or sea-based radars ($702 million).

Other major missiles in production during 1984/85 include:

Army. The Multiple Launch Rocket System (MLRS), a mobile rocket battery system operational since 1983; the Pershing

II battlefield ballistic missile, operationally deployed in Europe; the Stinger, a man-portable short range antiaircraft weapon; the Laser Hellfire, a long range helicopter-fired antiarmor missile for both Army and Navy use; the Copperhead laser-guided artillery projectile; the Army/Marine Corps TOW 2 antitank weapon, launched from helicopters or ground vehicles; and the Chaparral surface-to-air missile.

Navy. The Trident I submarine-launched ballistic missile, in operational service since 1982; the Phoenix long range air-to-air missile; the Harpoon air-launched/sub-launched antishipping cruise missile, also being procured for USAF use; the Marine Corps Laser Maverick close support air-to-surface weapon; the RAM (Rolling Airframe Missile), a system for shipboard defense against enemy antiship missiles; the Marine Corps Hawk mobile air defense system; and several versions of the infrared-guided Sidewinder and the radar-guided Sparrow air-to-air missiles carried by Navy and Air Force aircraft.

Air Force. In addition to Peacekeeper production, missiles under USAF cognizance include the Ground Launched Cruise Missile; the Imaging Infrared Maverick air-to-surface missile for USAF and Navy use; and the Air Launched Cruise Missile, production of which is winding down.

Among missiles in research and development status are the Navy Trident II submarine-launched ballistic missile, planned for first operational service in 1989; the Navy/Marine Corps Sidearm short-range antiradiation missile to be carried by attack aircraft and helicopters; the AMRAAM (Advanced Medium Range Air-to-Air Missile), an Air Force-developed replacement for the Sparrow; and the Army Advanced Antitank Weapon System, a man-portable weapon.

MISSILE PROGRAM PROCUREMENT INCLUDING INITIAL SPARES[a]

Fiscal Years 1984, 1985 and 1986
(Millions of Dollars)

Agency, Type and Model	1984		1985[E]		1986[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
AGM-130	—	$ —	—	$ —	97	$ 48.5
ALCM	240	412.3	—	79.3	—	34.4
AMRAAM[b]	—	57.8	—	73.1	90	438.5
GLCM	120	592.0	120	572.3	95	555.2
IIR Maverick[h]	1,980	303.1	2,600	381.4	3,695	517.7
Peacekeeper (M-X)[j]	21	2,153.5	21	1,000.0	48	3,180.2
Rapier	—	62.9	—	7.6	—	7.6
NAVY						
Harm[b]	698	$ 379.2	1,684	$ 589.5	2,619	$ 702.0
Harpoon[b]	315	287.9	439	356.8	395	338.6
Hawk[e]	400	97.0	500	126.1	500	140.1
Laser Maverick[e]	185	36.2	600	103.0	1,500	199.1
Phoenix	265	332.8	265	365.7	265	393.5
RAM	—	19.0	30	20.4	117	45.1
Sidearm[i]	—	—	—	—	168	20.6
Sidewinder[b]	2,050	134.0	1,000	72.3	2,020	137.9
Sparrow[b]	1,700	337.7	2,075	362.5	2,297	456.1
Standard	1,190	624.8	1,384	764.3	1,316	874.1
Tomahawk	124	341.7	180	578.5	249	780.0
Trident I	52	529.0	—	141.1	—	66.2
Trident II	—	—	—	162.9	—	582.0
ARMY						
Copperhead[c]	1,580	73.7	5,650	213.3	8,319	287.1
Laser Hellfire[d]	4,870	235.5	5,780	252.9	7,880	308.5
MLRS	36,000	545.4	50,472	561.9	72,000	569.4
Patriot	440	963.5	440	1,045.8	585	1,088.4
Pershing II	72	429.1	70	382.2	—	334.7
Stinger[f]	1,956	182.7	3,216	279.0	4,239	364.2
TOW 2[c]	20,200	215.5	15,555	252.8	24,882	299.5
Remotely Piloted Vehicles (RPVs)	—	—	—	—	8/3[k]	150.7
Chaparral	—	—	—	32.0	—	110.4

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).

NOTE See Research and Development Chapter for missile program RDT&E authorization data.

[E] Estimate. Latest year reflects Administration's budget proposal.

[a] Total Obligational Authority.

[b] Navy and Air Force funding.

[c] Army and Marine Corps funding.

[d] Army and Navy funding.

[e] Marine Corps funding.

[f] Army, Marine Corps and Air Force funding.

[g] Includes ground control stations.

[h] Navy, Marine Corps and Air Force funding.

[i] Navy and Marine Corps funding.

[j] Funding in the amount of $1.5 billion for the 21 missiles in FY 1985 will be provided from prior year programs.

[k] 8 Air Vehicles; 3 Ground Control Stations.

MAJOR MISSILES
RESEARCH, DEVELOPMENT, PRODUCTION, OPERATION

Program	Agency	Status	Systems Contractor(s)	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-AIR					
AMRAAM	USAF/USN	D	Hughes	Hercules	Hughes
Falcon	USAF	O	Hughes	Morton Thiokol	Hughes
Phoenix-54A	USN	O	Hughes	Hercules	Hughes
Phoenix-54C	USN	P	Hughes	Hercules	Hughes
Sidewinder-9H	USN	O	NASC	Bermite/Hercules	Ford Aero./Raytheon
Sidewinder-9J	USAF	O	Ford Aerospace	Hercules/Aerojet	Ford Aerospace
Sidewinder-9L	USN/USAF	O	NASC	Bermite/Hercules	Raytheon/Ford Aero.
Sidewinder-9M	USN/USAF	P	NASC	Morton Thiokol/Hercules	Raytheon/Ford Aero.
Sidewinder-9N	USAF	O	Ford Aero.	—	Ford Aero.
Sidewinder-9P	USAF	O	Ford Aero.	Hercules/Aerojet	Ford Aero.
Sparrow-7E	USN/USAF	O	Raytheon	Hercules/Aerojet	Raytheon
Sparrow-7F	USN/USAF	O	NASC	Hercules	Raytheon/GD
Sparrow-7M	USN/USAF	P	Raytheon/GD	Hercules	Raytheon/GD
AIR-TO-SURFACE					
ALCM	USAF	P	Boeing	Williams International	Honeywell/Litton
HARM	USN/USAF	P	Texas Instr.	Morton Thiokol	Texas Instr.
Harpoon*	USN	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI/Northrop
GBU-15	USAF	P	Rockwell	—	Hughes/Rockwell
Maverick-65A/B	USAF	P,O	Hughes	MTI/Aerojet	Hughes
Maverick-65D	USAF	P,O	Hughes	MTI/Aerojet	Hughes
Maverick-65E	USMC	P	Hughes	MTI/Aerojet	Hughes
Maverick-65F	USN	D	Hughes	MTI/Aerojet	Hughes
Shrike	USN/USAF	O	NWC/PMTC	Aerojet/Hercules	Texas Instruments
SRAM	USAF	O	Boeing	Lockheed	Singer
Standard ARM	USN/USAF	O	GD	NOSIH	GD
Walleye 1	USN	O	Martin Marietta	—	Martin Marietta/Hughes
Walleye 1ER	USN	R,D	NAC	—	NAC
Walleye 2	USN	O	NAC	—	NAC
Walleye 2 (ER/DL)	USN	O	NAC	—	NAC

*Also Surface-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor(s)	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-SURFACE (Cont'd.)					
AGM-130A	USAF	D	Rockwell	To be det'd	Hughes/Rockwell
AGM-130B	USAF	D	Rockwell	To be det'd	Hughes/Rockwell
ANTI-SUBMARINE					
Subroc	USN	O	Goodyear Aerospace	Morton Thiokol	Singer
SURFACE-TO-AIR					
Chaparral	Army	O	Ford Aerospace	Hercules/Bermite	GE/Raytheon
Improved Chaparral	Army	P,O	Ford Aerospace	Bermite	Ford Aerospace
Hawk	Army	P,O	Raytheon/Northrop	Aerojet	Raytheon
Patriot	Army	P	Raytheon/MM	Morton Thiokol	Raytheon
RAM	USN	P	General Dynamics	Bermite/Hercules/MTI	General Dynamics
Redeye	Army/USMC	O	General Dynamics	Atlantic Research	General Dynamics
Roland	Army	P,O	Hughes/Boeing	Hercules	Hughes/Boeing
Sea Sparrow	USN	P,O	Raytheon/GD	Aerojet/Hercules	Raytheon/GD
Standard MR (SM-1)	USN	P,O	General Dynamics	Aerojet/Hercules	General Dynamics
Standard MR (SM-2)	USN	P,O	General Dynamics	Aerojet/Hercules/MTI	General Dynamics
Standard ER (SM-1)	USN	O	General Dynamics	Atlantic Research	General Dynamics
Standard ER (SM-2)	USN	P,O	General Dynamics	Atlantic Research/MTI	General Dynamics
Stinger	Army/USMC	P,O	General Dynamics	Atlantic Research	General Dynamics
Tartar	USN	O	GD	Aerojet	GD
Terrier	USN	O	General Dynamics	Atlantic Research	General Dynamics
SURFACE-TO-SURFACE					
Harpoon*	USN	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI/Northrop
Minuteman 2	USAF	O	AFLC Hill AFB/Boeing	MTI/Aerojet/Hercules	Rockwell Autonetics
Minuteman 3	USAF	O	AFLC Hill AFB/Boeing	MTI/Aerojet	Rockwell Autonetics

*Also Air-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor(s)	Propulsion Manufacturer	Guidance Manufacturer
SURFACE-TO-SURFACE (Cont'd.)					
Peacekeeper (MX)	USAF	R,D	BMO/TRW/Martin Marietta	MTI/Avco/Aerojet/Hercules/RI Rocketdyne	Rockwell/Northrop/Honeywell
Polaris A3	USN	O	Lockheed MSC	Aerojet/Hercules	GE/Hughes/MIT/Raytheon
Poseidon C3	USN	O	Lockheed MSC	MTI/Hercules	GE/MIT/Hughes Raytheon
Tomahawk (SLCM)	USN	P	GD/MDC	Williams International	MDC/GD
Tomahawk (GLCM)	USAF	P	GD/MDC	Williams International	MDC/GD
Titan 2	USAF	O	AFLC Hill AFB/MM	Aerojet	GM/Delco Electronics
Trident C4	USN	P,O	Lockheed MSC	Hercules/MTI	GE/Draper/Raytheon/Hughes
BATTLEFIELD SUPPORT AND ANTIARMOR					
Copperhead	Army	P,O	Martin Marietta	—	Martin Marietta
Dragon	Army	P,O	Raytheon/Kollsman	MDC/Hercules/Raytheon	Raytheon
Hellfire	Army/USMC	P	Rockwell/MM	Morton Thiokol	Martin Marietta
Lance	Army	O	LTV Aero.	RI Rocketdyne	E-Systems/Sys-Donner/Arma
MLRS	Army	P,O	LTV Aero.	Atlantic Res.	—
Pershing 1A	Army	O	Martin Marietta	Morton Thiokol	Allied Bendix
Pershing 2	Army	P	Martin Marietta	Hercules	Goodyear Aerospace
Shillelagh	Army	O	Ford Aerospace	Hercules	Ford Aerospace
TOW	Army	O	Hughes	Hercules	Emerson El.
ITOW	Army	P,O	Hughes	Hercules	Emerson El.
TOW2	Army	P,O	Hughes	Hercules/MTI	Emerson El.

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."
Status: R—Research; D—Development; P—Production; O—Operational

Abb:
AFB - Air Force Base
AFLC - Air Force Logistics Cmd.
BMO - Ballistic Missile Office
GD - General Dynamics
GE - General Electric
LSI - Lear Siegler
MM - Martin Marietta
MDC - McDonnell Douglas
MIT - Massachusetts Institute of Technology
MTI - Morton Thiokol, Inc.
NAC - Naval Avionics Center
NASC - Naval Air Systems Command
NWC - Naval Weapons Center
PMTC - Pacific Missile Test Center
RI - Rockwell International
TI - Texas Instruments
USAF - United States Air Force
USMC - United States Marine Corps
USN - United States Navy

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILE PROCUREMENT[a]

By Agency
Fiscal Years 1960-1986
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT[a]	Air Force	Navy[a]	Army
1960	$ 3,027	$2,021	$ 423	$ 583
1961	2,972	1,922	493	557
1962	3,442	2,385	593	464
1963	3,817	2,676	718	423
1964	3,577	2,100	981	496
1965	2,096	1,320	522	254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr. Qtr.	402	347	148	(93)
1977	2,781	1,501[r]	905	374
1978	3,096	1,376	1,302	418
1979	3,786	1,537	1,702	547
1980	4,434	1,810	1,973	651
1981	5,809	2,366[r]	2,297	1,146
1982	6,782	3,069	2,444	1,269
1983	7,795	3,383	2,812	1,600
1984	9,527	4,640	2,809	2,079
1985[E]	11,462	5,828	3,364	2,270
1986[E]	14,252	7,593	3,935	2,724

Source: Department of Defense Budget (Annually).

NOTE: Detail may not add to totals because of rounding.

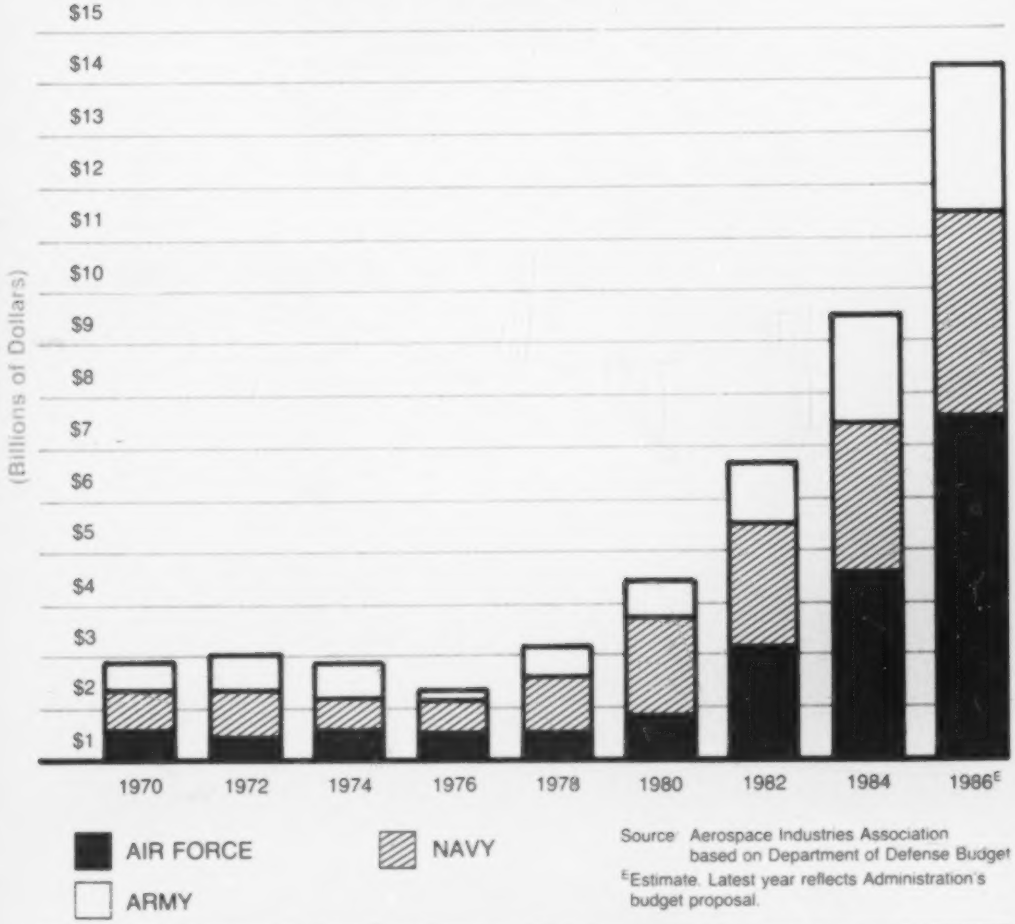
[a] Revised by AIA from previously published data to include Navy Weapons Procurement in Total Missile Procurement. Beginning 1978, DOD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.

[E] Estimate. Latest year reflects Administration's budget proposal.

[r] Revised.

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILE PROCUREMENT

By Agency
Fiscal Years 1970-1986

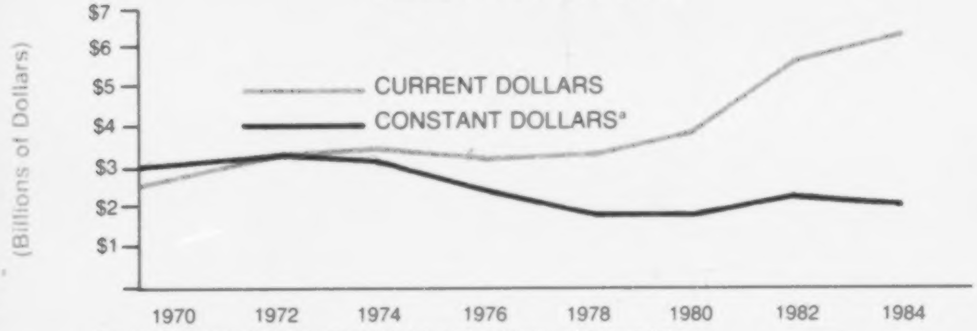


Source: Aerospace Industries Association based on Department of Defense Budget

[E] Estimate. Latest year reflects Administration's budget proposal.

SALES OF MISSILE SYSTEMS AND PARTS

Calendar Years 1970-1984



Source: Aerospace Industries Association based on Bureau of Census data.

[a] Based on revised aerospace composite deflator (1972 = 100)

ORDERS, SALES, AND BACKLOG MISSILE SYSTEMS AND PARTS[a]

Calendar Years 1968-1984
(Millions of Dollars)

Year	SALES-Current Dollars	SALES-Constant Dollars[c]
1968	$2,812	$3,312
1969	2,676	3,031
1970	2,826	3,029
1971	2,641	2,723
1972	3,335	3,335
1973	3,391	3,283
1974	3,454	3,078
1975	3,548	2,809
1976	3,237	2,349
1977	3,118	2,086
1978	3,264[b]	1,969
1979	3,706	2,010
1980	3,971	1,915
1981	4,662	2,010
1982	5,676	2,225
1983[r]	5,991	2,163
1984	6,094	2,028

Year	NET NEW ORDERS	BACKLOG AS OF DECEMBER 31
1968	$2,971	$3,218
1969	1,965	2,511
1970	3,041	2,721
1971	3,264	3,344
1972	3,633	3,642
1973	3,617	3,868
1974	4,059	4,473
1975	3,655	4,580
1976	3,036	4,379
1977	3,280	4,541
1978	2,948	4,581
1979	3,724	4,916
1980	4,961	5,558
1981	6,030	6,749
1982[r]	6,034	7,107
1983[r]	7,231	8,406
1984	7,731	10,043

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] Prior to 1980, includes space vehicle systems and parts sold to other than U.S. Government customers.

[b] AIA estimate based on MQ37D.

[c] Based on revised aerospace composite price deflator (1972 = 100).

[r] Revised.

ORDERS, SALES, AND BACKLOG ENGINES AND PROPULSION UNITS FOR MISSILES AND SPACE VEHICLES[a]

Calendar Years 1968-1984
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[c]		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1968	$ 907	$ 676	$ 231	$1,068	$ 796	$272
1969	702	667	35	795	755	40
1970	640	398	242	686	427	259
1971	605	596	9	624	614	9
1972	607	596	11	607	596	11
1973	627	607	20	607	588	19
1974	649	633	16	578	564	14
1975	643	626	17	509	496	13
1976	641	621	20	465	451	15
1977	787	757	30	526	506	20
1978	792	760	32	478	459	19
1979	952	915	37	516	496	20
1980	939	661	278	453	319	134
1981	1,204	786	418	519	339	180
1982	1,555	899	656	610	352	257
1983[r]	1,814	951	863	655	343	312
1984	2,305	1,116	1,189	767	371	396

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1968	$ 823	$ 743	$ 80	$ 535	$ 406	$129
1969	668	645	23	497	485	12
1970	759	743	16	617	610	7
1971	508	499	9	520	513	7
1972	758	742	16	671	659	12
1973	581	563	18	625	615	10
1974	702	680	22	678	662	16
1975	496	481	15	531	517	14
1976	783	763	20	673	659	14
1977	727	693	34	613	595	18
1978	967	919	48	788	754	34
1979	1,187	1,141	46	1,024	980	44
1980	1,121	653	568	1,284	871	413
1981	1,284	746	538	1,343	828	515
1982[r]	2,112	1,134	978	1,901	1,063	838
1983[r]	1,618	942	676	1,691	1,052	639
1984	3,770	2,258	1,512	3,156	2,194	962

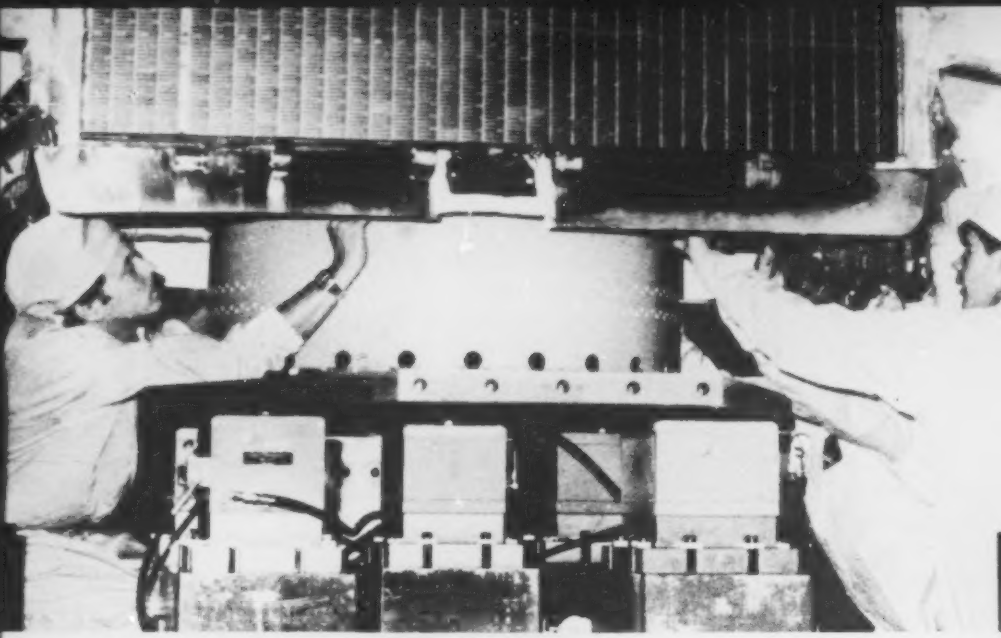
Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] See table in Space Programs Chapter for Orders, Sales, and Backlog, Space Vehicle Systems.

[b] Prior to 1980 includes figures for nonmilitary U.S. Government customers.

[c] Based on revised aerospace composite price deflator (1972 = 100).

[r] Revised.



II

SPACE PROGRAMS

In terms of federal funding, the U.S. space program continues to grow at a rapid pace. In Fiscal Year 1985, combined space budget authority for the Department of Defense, NASA, the Department of Commerce and other government agencies amounted to $20 billion, which represents an increase of more than 14 percent above the FY 1984 level of $17.5 billion.

As in previous recent years, the FY 1985 budget growth was due almost entirely to expanding space activities of the Department of Defense. DoD's budget authority was $12.9 billion, compared with $10.6 billion in FY 1984. NASA's allocation was $6.8 billion, up from $6.6 billion in the previous year—but in inflation-adjusted constant dollars NASA's budget authority was a shade below that of FY 1984. Although NASA funding was increased only moderately during the 1980s, this was the first time that contracting authority in real terms has declined since 1981.

In constant dollars, FY 1985 marked the highest level of space budget authority since 1967, but it remained below the peak years 1964-66.

Industry sales figures underline the current emphasis on military space activities. In 1984, sales of space systems, excluding propulsion units, amounted to $5.3 billion, up from $4.9 billion in the previous year; the 1984 figure was compounded of $3 billion in military sales (up some $600 million) and $2.2 billion in non-military sales (down $300 million).

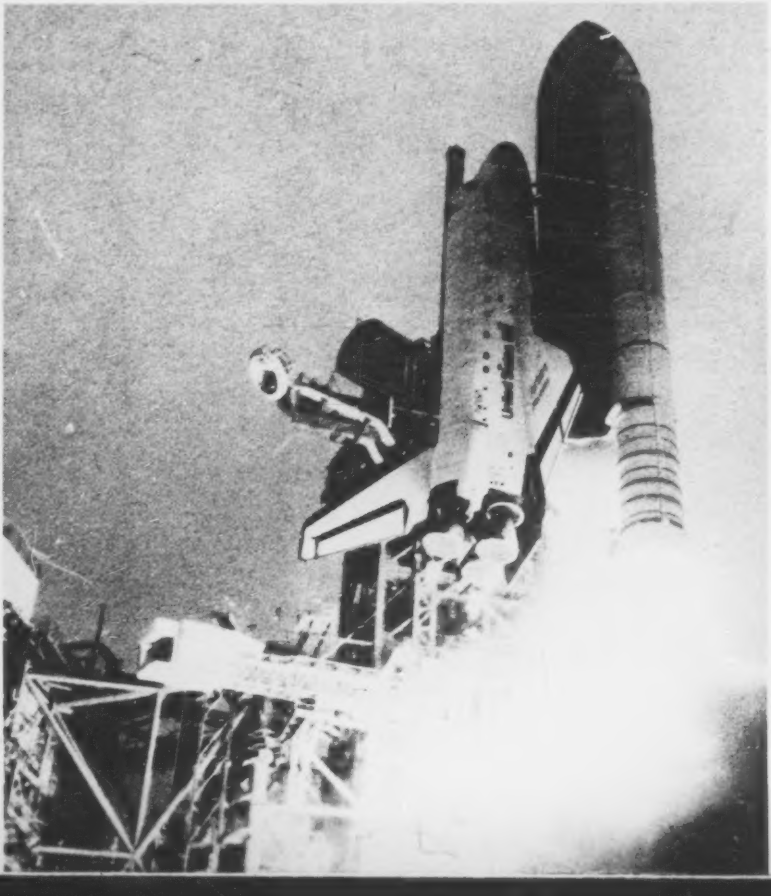
The U.S. conducted 22 space launches in 1984, the same number as in 1983. The 1984 total included five Space Shuttle Flights and 17 launches of expendable boosters. Some of these flights delivered multiple payloads, so, in all, 35 payloads were orbited during the year, including the five Shuttle Orbiters, which are technically research payloads; the figure compares with 31 in 1983.

Worldwide launches into Earth orbit or beyond numbered 129, two more than in the previous year. The Soviet Union conducted 97 launches, one fewer than in 1983. In addition to the 22 by the U.S., there were 10 other launches—four by the European Space Agency, three by Japan and three by the People's Republic of China. The all-time total of successful launches reached 2,642, of which 1,733 (66 percent) were made by the Soviet Union and 836 (32 percent) by the U.S.

NASA's principal development program is the permanently manned space station, which progressed from preliminary study to definition status with April/May 1985 awards to some 80 contractors for design work. First hardware fabrication is targeted for 1987/88 and the first of 8-10 missions needed to assemble the space station is tentatively planned for 1993. Among other major NASA development programs are Astro, a Shuttle-based observatory that will debut in 1986; the Space Telescope, an advanced astronomical observatory scheduled for 1986 launch; Galileo, a Jupiter orbiter/probe also targeted for 1986 launch; the Solar Optical Telescope, to be used aboard the Shuttle beginning in the late 1980s; the Advanced Communications Technology Satellite, designed to increase satellite communications capacity; the Venus Radar Mapper, to be launched in 1989; the Advanced X-ray Astrophysics Facility; and the Ocean Topography Experiment (TOPEX), planned as the experimental forerunner of a future ocean observation system.

Among unclassified military space programs are the Navstar Global Positioning System, a network of navigational satellites to be fully operational by 1988; the Advanced Defense Meteorological Satellite Program, scheduled for fully-operational status in 1986; the DSCS-III advanced communications satellite system; and the Milstar extremely high frequency, highly survivable communications satellite.

The major space-related program of the Department of Defense is the Strategic Defense Initiative (SDI) which, strictly speaking, is neither a space program nor a system development project, because the "system" has not been defined. Instead, SDI is a broad research and development program designed to investigate the potential of a number of technologies that might be applicable in a future system capable of intercepting incoming ballistic missiles. Among the largest defense R&D programs, funded at $1.4 billion in FY 1985, SDI embraces exploratory and technology development work on space-based, land-based and aircraft-based systems. It envisions a four-layered defensive system that would allow interception of attacking missiles in their boost and post-boost phases, during midcourse flight and in the terminal portions of their trajectories. Among possible defensive measures are laser, particle beam and kinetic energy weapons along with a variety of surveillance and tracking systems.



U.S. SPACECRAFT RECORD[a]

Calendar Years 1957-1984

Year	Earth Orbit[b]		Earth Escape[b]	
	Success	Failure	Success	Failure
1957	0	1	0	0
1958	5	8	0	4
1959	9	9	1	2
1960	16	12	1	2
1961	35	12	0	2
1962	55	12	4	1
1963	62	11	0	0
1964	69	8	4	0
1965	93	7	4	1
1966	94	12	7	1[c]
1967	78	4	10	0
1968	61	15	3	0
1969	58	1	8	1
1970	36	1	3	0
1971	45	2	8	1
1972	33	2	8	0
1973	23	2	3	0
1974	27	2	1	0
1975	30	4	4	0
1976	33	0	1	0
1977	27	2	2	0
1978	34	2	7	0
1979	18	0	0	0
1980	16	4	0	0
1981	20	1	0	0
1982	21	0	0	0
1983	31	0	0	0
1984	35	3	0	0
TOTAL	1,064	137	79	15

Source: NASA, "Aeronautics and Space Report of the President," (Annually).

[a] Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched by U.S. launch vehicles.

[b] The criterion of success or failure used is attainment of earth orbit or earth escape rather than judgment of mission success. "Escape" flights include all that were intended to go at least an altitude equal to lunar distance from the earth.

[c] This earth-escape failure did attain earth orbit and therefore is included in the earth-orbit success totals.

WORLDWIDE SPACE LAUNCHINGS WHICH ATTAINED EARTH ORBIT OR BEYOND[a]

Calendar Years 1957-1984

Country	Total 1957-1984	1980	1981	1982	1983	1984
TOTAL	2,642	105	123	121	127	129
U.S.S.R.	1,733	89	98	101	98	97
United States	836	13	18	18	22	22
Japan	27	2	3	1	3	3
People's Republic of China	14	—	1	1	1	3
European Space Agency	9	—	2	—	2	4
India	3	1	1	—	1	—
Other[b]	20[b]	—	—	—	—	—

Source: National Aeronautics and Space Administration, "Aeronautics and Space Report of the President," (Annually).

[a] Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

[b] Includes 10 by France, 8 by Italy (5 were U.S. spacecraft), 1 by Australia, and 1 by the United Kingdom.

SUCCESSFUL U.S. LAUNCHES

Calendar Year 1984

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Jan. 31 Defense Titan 34D	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Feb. 3 Challenger (STS-41B) Westar-6 (Feb. 3) Palapa-B2 (Feb. 6) Space Shuttle	SPACE TRANSPORTATION SYSTEM: sixth operational flight, fourth flight of Orbiter Challenger, to deploy two communications satellites, rendezvous test operations using Integrated Rendezvous Target (IRT), and test and evaluate Manned Maneuvering Unit (MMU).
Feb. 5 Defense Atlas H	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Mar. 1 Landsat-5 Delta 3920	EARTH OBSERVATION: fifth experimental earth resources satellite, to replace ailing Landsat-4.
Uosat-2 Delta 3920	COMMUNICATIONS SATELLITE: secondary payload with Landsat-5, for amateur radio communications.
Apr. 6 Challenger (STS-41C) Long Duration Exposure Facility (LDEF-1) (Apr. 7) Space Shuttle	SPACE TRANSPORTATION SYSTEM: eleventh STS flight, first flight of orbiter Discovery. Long Duration Exposure Facility, with accommodations for experiments requiring long-term exposure to space, successfully deployed from cargo bay. LDEF-1 was scheduled for retrieval in 10 mos. but recapture delayed due to Shuttle schedule changes.
Apr. 14 Defense Titan 34D	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Apr. 17 Defense Titan IIIB	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Reentered August 13.
June 9 Intelsat V F9 Atlas-Centaur	COMMUNICATIONS SATELLITE: seventh of series of 9 satellites, launched by NASA for 108-member nation International Telecommunications Satellite Organization (Intelsat). Satellite was to be placed in geosynchronous orbit for Intelsat to provide 12,000 voice circuits and 2 color TV channels simultaneously. Launch vehicle failed to boost satellite to useful orbit. Reentered Oct. 24.

(Continued on next page)

SUCCESSFUL U.S. LAUNCHES 1984 (Continued)

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
June 13 Navstar-9 Atlas E	NAVIGATION SATELLITE: global positioning system satellite launched by DOD in joint military services' developmental network. Still in orbit.
June 25 Defense Titan 34D	DOD SATELLITE: development of spaceflight techniques and technology. Spacecraft not announced. Reentered Oct. 18.
August 16 Charge Composition Explorer (CCE) Ion Release Module (IRM) United Kingdom Satellite (UKS) Delta 3924	SCIENTIFIC SATELLITES: Charge Composition Explorer is one of 3 satellites comprising Active Magnetospheric Particle Tracer Explorers (AMPTE) Mission. Satellite contains 5 instruments: Hot Plasma Composition Measurement Spectrometer (HPC), Charge Energy Mass Spectrometer (CHEM), Medium Energy Particle Analyzer (MEPA), Magnetometer (MAG) and Plasma Wave Experiment (PWE). Data being returned from orbit. Ion Release Module second of the AMPTE satellites, built by Federal Republic of Germany. Results of chemical releases being analyzed. United Kingdom Satellite was operated in close proximity to IRM when barium or lithium released. Results obtained. Satellite failed in orbit, January 1985.
August 28 Defense Titan IIIB	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
August 30 Discovery (STS-41D) SBS-4 Syncom IV-2 (Leasat-2) Telstar 3-C (Aug. 31) Space Shuttle	SPACE TRANSPORTATION SYSTEM: to check out Space Shuttle, launch communications satellites SBS-4 (Satellite Business Systems), Syncom IV-2 (Hughes Communication Services, Inc.), Telstar-3C (AT&T); complete assigned experiments and test objectives. Carried scientific payloads OAST-1, Continuous Flow Electrophoresis Equipment (CFES), IMAX, Radiation Monitoring Equipment (RME), Clouds Photograph Experiment and 1 student experiment.
Sept. 8 Navstar-10 Atlas E	NAVIGATION SATELLITE: global positioning system spacecraft with same basic configuration as Navstar-9 launched into orbit.
Sept. 21 Galaxy-3 Delta 3920	COMMUNICATIONS SATELLITE: third in series, launched for Hughes Communications.
Oct. 5 Challenger (STS-41G) Earth Radiation Budget Satellite (ERBS) Space Shuttle	SPACE TRANSPORTATION SYSTEM: thirteenth STS flight. Mission included launching Earth Radiation Budget Satellite (ERBS). ERBS was successfully deployed using Remote Manipulator Arm (RMS), enabling ERBS to provide global measurements of the Sun's radiation reflected and absorbed by earth. Two other ERBS satellites

(Continued on next page)

SUCCESSFUL U.S. LAUNCHES 1984 (Continued)

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
	were scheduled for deployment in 1985. Challenger also performed scientific experiments using OSTA-3 and other payloads. Payload included: Shuttle Imaging Radar-B (SIR-B), Large Format Camera (LFC), Measurement of Atmospheric Pollution from Satellites (MAPS) and Feature Identification and Location Experiment (FILE); IMAX, Orbital Refueling System (ORS), Canadian Experiment (CANEX), Radiation Monitoring Equipment (RME), Thermoluminescent Dosimeter (TLD), and Auroral Photography Experiment (APE). Eight Gateway Special experiments were in cargo bay.
Oct. 12 Defense Nova-3 Scout	NAVIGATION SATELLITE: second in series of improved TRANSIT navigational satellites launched by NASA for the Navy. Satellite same configuration as Nova-1 launched May 15, 1981.
Nov. 8 Discovery (STS-51A) Anik-D2 (Nov. 9) Syncom IV-1 (Nov. 10) Space Shuttle	SPACE TRANSPORTATION SYSTEM: fourteenth STS flight, second mission of orbiter Discovery with mission to launch Anik-D2 (Telsat Canada) and Syncom IV-1 (DOD) communications satellites. Syncom IV-1 was second of four satellites to be leased by DOD (Leasats) to replace FleetSatCom spacecraft for worldwide UHF communications between ships, planes, and fixed facilities. Discovery also carried experiments: Diffusive Mixing of Organic Solutions (DMOS) and Radiation Monitoring Equipment (RME).
Nov. 14 NATO IIID Delta 3914	COMMUNICATIONS SATELLITE: NASA successfully launched fourth in series of NATO defense-related communications satellites, on cost-reimbursable basis.
Dec. 4 Defense Titan 34D	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Dec. 12 NOAA-9 Atlas E	WEATHER OBSERVATION SATELLITE: fifth NOAA-funded operational spacecraft of Tiros-N series, successfully launched by NASA; satellite replaced NOAA-7 as afternoon satellite in NOAA's two polar satellite system. Also onboard: second set of Earth Radiation Budget Experiment instruments, Solar Backscatter Ultraviolet Spectral Radiometer, Mod-2 (SBUV/2), and Search and Rescue instruments. Spacecraft returning data.
Dec. 21 Defense Titan 34D	DOD SATELLITES: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.

Source: NASA, Historian's Office.

U.S. SPACE LAUNCH VEHICLES

As of 1984

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Geo-synch.-Transfer Orbit	Circular Sun-Synch. Orbit
Scout (1960; 1979)	1. Algol IIIA* 2. Castor IIA* 3. Antares IIIA* 4. Altair IIIA*	431.1 285.2 83.1 25.6	255 205[b]	—	155[b]
Delta 2900 Series (Thor-Delta) (1960; 1973)	1. Thor plus 9 TX 354-5* 2. Delta 3. TE 364-4*	912.0 147[c] 44.2 65.8	2,000 1,410[b]	705	1,250[b]
Delta 3900 Series (Thor-Delta)[d] (1960; 1982)	1. Thor plus 9 TX 526-2* 2. Delta	912.0 375[c] 44.2	3,045 2,180[b]	1,275	2,135[b]
Atlas E (1967; 1972)	1. Atlas booster & sustainer	1,722.0	2,090[b,e]	—	1,500[b]
Atlas-Centaur (1962; 1984)	1. Atlas booster & sustainer 2. Centaur	1,913.0 146.0	6,100	2,360[f]	—

Vehicle and Launch Date	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo-synch Orbit	Sun-Synch. Transfer Orbit
Titan IIIB-Agena (1966)	1. LR-87 2. LR-91 3. Agena	2,341.0 455.1 71.2	3,600[b]	—	3,060[b]

(Continued on next page)

U.S. SPACE LAUNCH VEHICLES

As of 1984 (Continued)

Vehicle and Launch Date	Stages	Thrust (Kilonewtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo.-Synch. Orbit	Sun Synch. Transfer Orbit
Titan III(34)D/IUS (1983)	1. Two 5½-segment 3.05-m. dia*	11,564.8	14,920	1,850[b]	—
	2. LR-87	2,366.3			
	3. LR-91	449.3			
	4. IUS 1st stage*	275.8			
	5. IUS 2nd stage*	115.7			
Titan III(34)D/ Transtage (1984)	1. Two 5½-segment 3.05-m. dia*	11,564.8	14,920	1,850[b]	—
	2. LR-87	2,366.3			
	3. LR-91	449.3			
	4. Transtage	69.8			
Space Shuttle (reusable) (1981)	1. Orbiter; 3 main engines (SSMEs) fire in parallel with SRBs	1,670[c]	29,500 in full performance configuration (280-420 km orbit)		
	2. Two solid-fueled rocket boosters (SRBs) mounted on external tank (ET) fire in parallel with SSMEs	11,790[c]			

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.

* Solid propellant; all others are liquid.

[a] Due east launch except as indicated.

[b] Polar launch.

[c] Each.

[d] Maximum performance based on 3920 and 3920/PAM (payload assist module) configurations.

[e] With dual TE 364-4.

[f] 96° flight azimuth.

U.S. MANNED SPACE FLIGHT LOG

Calendar Year 1984

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
Feb. 3	Space Shuttle Challenger (STS 10) Crew: Vance D. Brand Robert L. Gibson Bruce McCandless Ronald E. McNair Robert L. Stewart	7:23:16	Tenth flight of Space Shuttle. Two communications satellites failed to achieve orbit. First use of Manned Maneuvering Unit (MMU) in space.
Apr. 6	Space Shuttle Challenger (STS 11) Crew: Robert L. Crippen Frances R. Scobee Terry J. Hart George D. Nelson James D. Van Hoften	6:23:41	Eleventh flight of Space Shuttle. Deployment of LDEF-1, for later retrieval. Solar Maximum Satellite retrieved, repaired, and redeployed.
Aug. 30	Space Shuttle Discovery (STS 12) Crew: Henry W. Hartsfield Michael L. Coats Richard M. Mullane Steven A. Hawley Judith A. Resnik Charles D. Walker	6:00:56	Twelfth flight of Space Shuttle. First flight of U.S. non-astronaut (Walker: Mission Specialist from McDonnell Douglas Corp.)
Sept. 5	Space Shuttle Challenger (STS 13) Crew: Robert L. Crippen Jon A. McBride Kathryn D. Sullivan Sally K. Ride David Leestma Paul D. Scully-Power Mare Garneau	8:05:24	Thirteenth flight of Space Shuttle. First flight of seven crew-members. First flight of two U.S. women. Included one Canadian (Garneau).
Nov. 8	Space Shuttle Discovery (STS 14) Crew: Frederick H. Hauck David M. Walker Joseph P. Allen Anna L. Fisher Dale A. Gardner	7:23:45	Fourteenth flight of Space Shuttle. First retrieval and return to earth of two disabled satellites (Westar-6 and Palapa-B2).

Source: NASA, Historian's Office.

ORDERS, SALES, AND BACKLOG
SPACE VEHICLE SYSTEMS

(Excluding Engines and Propulsion Units)[a]
Calendar Years 1968-1984
(Millions of Dollars)

Year	SALES-Current Dollars			SALES-Constant Dollars[c]		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1968	$2,357	$ 899	$1,458	$2,776	$1,059	$1,717
1969	2,282	1,187	1,095	2,584	1,344	1,240
1970	1,956	1,025	931	2,096	1,099	998
1971	1,725	860	865	1,778	887	892
1972	1,656	905	751	1,656	905	751
1973	1,562	902	660	1,512	873	639
1974	1,751	944	807	1,561	841	719
1975	2,119	1,096	1,023	1,678	868	810
1976	2,002	904	1,098	1,453	656	797
1977	1,870	814	1,056	1,251	544	706
1978	2,324	1,006	1,318	1,402	607	795
1979	2,539	1,105	1,434	1,377	599	778
1980	3,483	1,461	2,022	1,679	704	975
1981	3,856	1,736	2,120	1,663	749	914
1982	4,749	2,606	2,143	1,862	1,022	840
1983	4,940	2,420	2,520	1,784	874	910
1984	5,256	3,019	2,237	1,749	1,005	744

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military[b]	Non-Military	TOTAL	Military[b]	Non-Military
1968	$2,659	$1,169	$1,490	$1,329	$ 834	$ 495
1969	2,231	1,173	1,058	1,330	869	461
1970	1,811	973	838	1,184	786	398
1971	1,457	677	780	916	603	313
1972	1,699	948	751	959	646	313
1973	1,780	1,179	601	1,177	923	254
1974	2,066	1,152	914	1,492	1,131	361
1975	1,931	984	947	1,304	1,019	285
1976	1,932	787	1,145	1,234	902	332
1977	2,225	1,175	1,050	1,589	1,263	326
1978	3,157	1,436	1,721[d]	2,188	1,693	495
1979	2,698	1,018	1,680	1,448	909	539
1980	3,636	1,625	2,011	2,099	1,218	881
1981	5,062	2,878	2,184	3,163	2,166	997
1982[r]	5,842	2,718	3,124	4,254	2,277	1,977
1983[r]	5,399	3,016	2,383	4,865	2,733	2,132
1984	5,057	3,385	1,672	4,666	3,099	1,567

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)," Series MA37D (Annually).

[a] See table in Missile Program Chapter for Orders, Sales, and Backlog, Engine and Propulsion Units for Missiles and Space Vehicles.

[b] Space vehicle systems and parts sold to other than U.S. Government customers included as of 1980; previously, this product group combined with missile systems and parts.

[c] Based on revised aerospace composite price deflator (1972 = 100); detail may not add to totals because of rounding.

[d] AIA estimate based on MQ37D data.

[r] Revised.

FEDERAL SPACE ACTIVITIES OUTLAYS

Fiscal Years 1955-1985[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1955	$ 75.3	$ 73.8	$ 1.5	$ —	$ —	$ —
1956	100.1	71.1	16.5	6.3	—	6.2
1957	150.1	76.1	47.5	19.2	—	7.3
1958	248.9	89.2	135.5	20.2	—	4.0
1959	433.9	58.8	341.0	32.6	—	1.5
1960	888.4	329.2	518.1	41.1	—	—
1961	1,467.9	693.6	710.0	64.3	—	—
1962	2,386.6	1,225.9	1,028.8	130.0	1.0	0.9
1963	4,078.6	2,516.8	1,367.5	181.0	12.2	1.1
1964	5,929.8	4,131.3	1,563.5	220.1	12.3	2.6
1965	6,886.1	5,035.0	1,591.8	232.2	24.1	3.0
1966	7,718.5	5,857.9	1,637.4	188.3	28.1	6.8
1967	7,237.3	5,336.7	1,673.1	183.6	38.6	5.3
1968	6,666.7	4,595.3	1,890.2	146.5	29.0	5.7
1969	6,326.1	4,078.0	2,095.0	117.5	31.0	4.6
1970	5,453.2	3,565.2	1,756.1	102.6	24.0	5.3
1971	4,999.0	3,171.0	1,693.0	97.3	29.8	7.9
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,719.4	3,069.4	1,557.0	51.1	29.4	12.5
1974	4,853.9	2,960.4	1,777.0	38.8	64.0	13.7
1975	4,890.8	2,950.9	1,831.1	34.3	63.6	10.9
1976	5,313.9	3,336.3	1,864.4	25.7	71.1	16.4
Tr. Qtr.	1,361.0	868.6	458.1	7.5	23.2	3.6
1977	5,559.1	3,599.5	1,832.7	22.2	86.9	17.8
1978	6,188.2	3,582.4	2,457.0	28.6	100.7	19.5
1979	6,808.3	3,743.9	2,891.8	54.7	97.4	20.5
1980	7,667.7	4,340.1	3,162.3	48.8	88.7	27.8
1981	9,165.5	4,877.1	4,130.5	46.9	81.0	30.0
1982	10,466.2	5,463.3	4,771.5	59.5	142.4	29.5
1983	12,590.4	6,100.9	6,246.7	39.6	178.0	25.2
1984[E]	14,788.7	6,426.8	8,062.1	37.2	234.9	27.7
1985[E]	17,874.6	6,676.6	10,888.4	35.0	254.3	20.3

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] FY 1986 and revised FY 1985 estimates not available at time of publication.

[b] Excludes amounts for air transportation.

[c] Departments of Interior and Agriculture, and The National Science Foundation. NSF funding transferred to NASA after 1982.

[E] Estimate. Latest year reflects Administration's budget proposal.

FEDERAL SPACE ACTIVITIES OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1955-1985[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1955	$ 122.9	$ 120.5	$ 2.4	$ —	$ —	$ —
1956	159.1	113.0	26.2	10.0	—	9.9
1957	230.0	116.6	72.8	29.4	—	11.2
1958	372.4	133.5	202.8	30.2	—	6.0
1959	636.6	86.3	500.3	47.8	—	2.2
1960	1,277.0	473.2	744.7	59.1	—	—
1961	2,086.3	985.8	1,009.1	91.4	—	—
1962	3,343.5	1,717.4	1,441.3	182.1	1.4	1.3
1963	5,620.2	3,468.1	1,884.4	249.4	16.8	1.5
1964	8,052.4	5,610.1	2,123.2	298.9	16.7	3.5
1965	9,182.7	6,714.2	2,122.7	309.6	32.1	4.0
1966	10,026.6	7,609.6	2,127.0	244.6	36.5	8.8
1967	9,110.4	6,717.9	2,106.1	231.1	48.6	6.7
1968	8,099.5	5,582.9	2,296.4	178.0	35.2	6.9
1969	7,340.6	4,732.0	2,431.0	136.3	36.0	5.3
1970	5,989.2	3,915.7	1,928.7	112.7	26.4	5.8
1971	5,228.0	3,316.3	1,770.6	101.8	31.2	8.3
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,518.3	2,938.6	1,490.7	48.9	28.1	12.0
1974	4,331.5	2,641.8	1,585.8	34.6	57.1	12.2
1975	3,967.6	2,393.9	1,485.4	27.8	51.6	8.8
1976	4,029.0	2,529.6	1,413.6	19.5	53.9	12.4
Tr. Qtr.	1,004.1	640.8	338.0	5.5	17.1	2.7
1977	3,949.1	2,557.1	1,301.9	15.8	61.7	12.6
1978	4,116.4	2,383.0	1,634.4	19.0	67.0	13.0
1979	4,165.1	2,290.4	1,769.1	33.5	59.6	12.5
1980	4,316.7	2,443.3	1,780.3	27.5	49.9	15.7
1981[r]	4,691.8	2,496.6	2,114.4	24.0	41.5	15.4
1982[r]	4,999.4	2,609.6	2,279.2	28.4	68.0	14.1
1983	5,786.3	2,803.9	2,870.9	18.2	81.8	11.6
1984[E]	6,547.1	2,845.2	3,569.2	16.5	104.0	12.3
1985[E]	7,637.4	2,852.8	4,652.4	14.9	108.7	8.7

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] FY 1986 and revised FY 1985 estimates not available at time of publication.
[b] Based on fiscal year GNP implicit price deflator.
[c] Excludes amounts for air transportation.
[d] Departments of Interior and Agriculture, and The National Science Foundation. NSF funding transferred to NASA after 1982.
[E] Estimate. Latest year reflects Administration's budget proposal.
[r] Revised.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1955-1985[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1955	$ 60	$ 57	$ 3	$ —	$ —	$ —
1956	117	73	30	7	—	7
1957	179	78	71	21	—	8
1958	348	117	206	21	—	3
1959	785	261	490	34	—	—
1960	1,066	462	561	43	—	(*d*)
1961	1,808	926	814	68	—	1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,970	5,065	1,689	187	27	3
1967	6,710	4,830	1,664	184	29	3
1968	6,529	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,341	3,547	1,678	103	8	4
1971	4,741	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	10
1973	4,825	3,093	1,623	54	40	15
1974	4,640	2,759	1,766	42	60	14
1975	4,914	2,915	1,892	30	64	13
1976	5,320	3,225	1,983	23	72	16
Tr. Qtr.	1,341	849	460	5	22	4
1977	5,983	3,440	2,412	22	91	18
1978	6,518	3,623	2,738	34	103	20
1979	7,244	4,030	3,036	59	98	21
1980	8,689	4,680	3,848	40	93	28
1981	9,978	4,992	4,828	41	87	30
1982	12,441	5,528	6,679	61	145[r]	29
1983	15,589	6,328	9,019	39	178	25
1984[E]	17,477	6,590	10,590	34	235	28
1985[E]	20,025	6,804	12,913	34	255	20

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
Note: Detail may not add to totals because of rounding.
a FY 1986 and revised FY 1985 estimates not available at time of publication.
b Excludes amounts for air transportation.
c Departments of Interior and Agriculture, and the National Science Foundation. NSF funding transferred to NASA after 1982.
d Less than $500,000.
E Estimate. Latest year reflects Administration's budget proposal.
r Revised.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1955-1985[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1955	$ 98	$ 93	$ 5	$ —	$ —	$ —
1956	186	116	48	11	—	11
1957	274	120	109	32	—	12
1958	521	175	308	31	—	5
1959	1,152	383	719	50	—	—
1960	1,532	664	806	62	—	(e)
1961	2,570	1,316	1,157	97	—	1
1962	4,616	2,518	1,818	207	71	1
1963	7,489	4,997	2,136	295	59	3
1964	9,276	6,812	2,171	285	4	4
1965	9,276	6,852	2,099	305	16	4
1966	9,054	6,580	2,194	243	35	4
1967	8,447	6,080	2,095	232	37	4
1968	7,932	5,382	2,335	176	34	5
1969	6,934	4,435	2,336	137	23	3
1970	5,866	3,896	1,843	113	9	4
1971	4,958	3,243	1,581	99	28	5
1972	4,575	3,071	1,407	55	31	10
1973	4,619	2,961	1,554	52	38	14
1974	4,141	2,462	1,576	37	54	12
1975	3,986	2,365	1,535	24	52	11
1976	4,034	2,445	1,504	17	55	12
Tr. Qtr.	989	626	339	4	16	3
1977	4,250	2,444	1,713	16	65	13
1978	4,336	2,410	1,821	23	69	13
1979	4,432	2,465	1,857	36	60	13
1980	4,892	2,635	2,166	23	52	16
1981[r]	5,108	2,555	2,471	21	45	15
1982[r]	5,943	2,641	3,190	29	69	14
1983	7,164	2,908	4,145	18	82	11
1984[E]	7,737	2,917	4,688	15	104	12
1985[E]	8,556	2,907	5,517	15	109	9

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President," (Annually).

[a] FY 1986 and revised FY 1985 estimates not available at time of publication.

[b] Based on fiscal year GNP implicit price deflator.

[c] Excludes amounts for air transportation.

[d] Departments of Interior and Agriculture, and The National Science Foundation. NSF funding transferred to NASA after 1982.

[e] Less than $500,000.

[E] Estimate. Latest year reflects Administration's budget proposal.

[r] Revised from constant dollar data previously reported by AIA because of revision of GNP deflator series.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY

Fiscal Years 1960-1986
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 614	$ 333	$190	$ 91
1961	964	672	125	167
1962	1,825	1,285	326	214
1963	3,673	2,929	744	*(a)*
1964	5,099	3,890	713	496
1965	5,250	4,360	267	623
1966	5,175	4,502	61	602
1967	4,968	4,235	85	648
1968	4,589	3,912	38	639
1969	3,995	3,314	33	648
1970	3,749	2,993	53	703
1971	3,312	2,556	26	730
1972	3,308	2,523	53	732
1973	3,408	2,599	79	730
1974	3,040	2,194	101	745
1975	3,231	2,323	143	765
1976	3,552	2,678	82	792
Tr. Qtr.	932	700	11	221
1977	3,819	2,856	118	845
1978	4,064	3,012	162	890
1979	4,559	3,477	148	934
1980	5,243	4,088	159	996
1981	5,522	4,334	117	1,071
1982	6,020	4,772	114	1,134
1983	6,875	5,539	139	1,197

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$7,316	$2,064	$3,772	$223	$1,256
1985[E]	7,511	2,423	3,602	150	1,336
1986[E]	7,886	2,882	3,510	149	1,345

Source: [illegible]ne Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
a Included in Research and Development for one year.
E Estimate. Latest year reflects Administration's budget proposal.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1960-1986
(Millions of Constant Dollars 1972 = 100[a])

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 883	$ 479	$ 273	$ 131
1961	1,370	955	178	237
1962	2,557	1,800	457	300
1963	5,061	4,036	1,025	*(b)*
1964	6,924	5,282	968	674
1965	7,001	5,814	356	831
1966	6,723	5,848	79	795
1967	6,254	5,331	107	816
1968	5,575	4,753	46	776
1969	4,636	3,845	38	752
1970	4,118	3,287	58	772
1971	3,464	2,673	27	763
1972	3,308	2,523	53	732
1973	3,263	2,488	76	699
1974	2,713	1,958	90	665
1975	2,621	1,884	116	621
1976	2,693	2,030	62	601
Tr. Qtr.	688	516	8	163
1977	2,713	2,029	84	600
1978	2,703	2,004	108	592
1979	2,789	2,127	91	571
1980	2,947	2,301	90	561
1981[r]	2,827	2,219	60	548
1982[r]	2,876	2,279	54	542
1983[r]	3,160	2,546	64	550

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$3,239	$ 914	$1,670	$ 99	$ 556
1985[E]	3,209	1,035	1,539	64	571
1986[E]	3,229	1,180	1,437	61	551

Source: AIA, derived from "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding
[a] Based on fiscal year GNP implicit price deflator.
[b] Included in Research and Development for one year.
[E] Estimate. Latest year reflects Administration's budget proposal.
[r] Revised.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS

Fiscal Years 1960-1986
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 401	$ 256	$ 54	$ 91
1961	744	487	98	159
1962	1,257	936	114	207
1963	2,552	1,912	225	416
1964	4,171	3,317	438	416
1965	5,093	3,984	531	578
1966	5,933	4,741	573	619
1967	5,426	4,487	289	650
1968	4,724	3,946	126	652
1969	4,251	3,530	65	656
1970	3,753	2,992	54	707
1971	3,382	2,630	44	708
1972	3,422	2,623	50	749
1973	3,315	2,541	45	729
1974	3,256	2,421	75	760
1975	3,266	2,420	85	761
1976	3,669	2,749	121	799
Tr. Qtr.	952	731	26	195
1977	3,945	2,980	105	860
1978	3,983	2,989	124	870
1979	4,196	3,139	133	925
1980	4,852	3,702	140	1,010
1981	5,426	4,228	147	1,050
1982	6,035	4,796	109	1,130
1983	6,664	5,316	108	1,240

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$7,048	$2,792	$2,915	$109	$1,232
1985^E	7,317	2,397	3,421	167	1,331
1986^E	7,772	2,694	3,571	162	1,345

Source: "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate. Latest year reflects Administration's budget proposal.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1960-1986
(Millions of Constant Dollars, 1972 = 100[a])

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 576	$ 368	$ 78	$131
1961	1,057	692	139	226
1962	1,761	1,311	160	290
1963	3,517	2,635	310	573
1964	5,664	4,504	595	565
1965	6,792	5,313	708	771
1966	7,707	6,159	744	804
1967	6,830	5,648	364	818
1968	5,739	4,794	153	792
1969	4,933	4,097	75	761
1970	4,122	3,286	59	776
1971	3,537	2,750	46	740
1972	3,422	2,623	50	749
1973	3,174	2,433	43	698
1974	2,906	2,160	67	678
1975	2,649	1,963	69	617
1976	2,782	2,084	92	606
Tr. Qtr.	702	539	19	144
1977	2,802	2,117	75	611
1978	2,650	1,988	82	579
1979	2,567	1,920	81	566
1980	2,732	2,084	79	569
1981[r]	2,777	2,164	75	537
1982[r]	2,883	2,291	52	540
1983[r]	3,063	2,443	50	570

Year	TOTAL	Research and Development	Space Flight Control and Data Communications	Construction of Facilities	Research and Program Management
1984	$3,120	$1,236	$1,291	$48	$545
1985[E]	3,126	1,024	1,462	71	569
1986[E]	3,182	1,103	1,462	66	551

Source: AIA, derived from "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] Based on fiscal year GNP implicit price deflator.
[E] Estimate. Latest year reflects Administration's budget proposal.
[r] Revised.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY FOR RESEARCH AND DEVELOPMENT AND SPACE FLIGHT, CONTROL & DATA COMMUNICATIONS

Fiscal Years 1984-1986
(Millions of Dollars)

	1984	1985[E]	1986[E]
RESEARCH AND DEVELOPMENT—TOTAL	$2,064	$2,423	$2,882
Space Station—Total	$ (a)	$ 150	$ 230
Space Transportation Capability Development—Total	432	351	459
Space Science & Applications—Total	1,157	1,405	1,613
Physics and Astronomy	568	677	630
Planetary Exploration	217	291	359
Life Sciences	58	62	72
Space Applications	314	374	552
Technology Utilization—Total	9	10	11
Commercial Use of Space—Total	—	(b)	30
Aeronautics & Space Technology—Total	452	492	522
Aeronautical Research & Technology	315	342	354
Space Research & Technology	137	150	168
Tracking and Data Advanced Systems—Total	14	15	16
SPACE FLIGHT, CONTROL AND DATA COMMUNICATIONS—TOTAL	$3,772	$3,602	$3,510
Space Shuttle Production & Operational Capability—Total	$1,646	$1,492	$ 977
Orbiter	725	655	334
Launch & Mission Support	278	230	164
Propulsion Systems	638	582	454
Changes & Systems Upgrading	6	25	25
Space Transportation Operations—Total	1,452	1,314	1,725
Shuttle Operations	1,402	1,314	1,725
Expendable Launch Vehicles	50	—	—
Space and Ground Network, Communications & Data Systems—Total	674	796	808

Source: "NASA Budget Briefing Background Material" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] $21.9 million funded as parts of the Office of Space Flight ($13.0 million), Office of Aeronautics and Space Technology ($6.0 million), Office of Space Science and Applications ($2.0 million), and Office of Space Tracking and Data Systems ($0.9 million).

[b] $8.5 million funded as parts of the Office of Space Station ($0.2 million), Office of Space Flight ($4.5 million), Office of Space Science and Applications ($2.0 million), Office of Aeronautics and Space Technology ($0.7 million) and Office of Space Tracking and Data Systems ($1.1 million).

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE SPACE PROGRAMS[a] PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E

Fiscal Years 1984, 1985 and 1986
(Millions of Dollars)

Agency and Program	1984		1985[E]		1986[E]	
	Procurement	RDT&E	Procurement	RDT&E	Procurement	RDT&E
AIR FORCE						
Air Force Satellite Communications System (Afsatcom)	$ 30.4	$ —	$ —	$ —	$ 34.4	$ —
Defense Meteorological Satellite Program (DMSP)	33.4	23.0	139.4	42.6	54.0	71.3
Defense Satellite Communications System (DSCS)	111.7	34.9	250.4	31.6	149.2	6.9
Navstar Global Positioning System	256.1	25.2	331.9	33.5	197.4	48.5
Space Defense System	19.3	202.7	74.0	133.0	97.9	149.9
Space Launch Support	108.4	34.9	187.9	93.8	296.0	79.2
Space Shuttle	193.0	332.1	137.3	337.0	22.1	132.0
Space Boosters	—	15.4	25.2	15.4	126.9	221.4
NAVY						
Fleet Satellite Communications (Fltsatcom)	$101.5	$ 7.0	$ 51.4	$ 11.3	$ 56.3	$ 10.2
JOINT PROGRAMS						
Strategic Defense Initiative	—	$ 50.0	—	$1,397.3	—	$3,722.2

Source: "Program Acquisition Costs by Weapon System," "Procurement Program (P-1)," and "R.D,T&E Programs (R-1)," Department of Defense Budget (Annually).

[a] Total Obligational Authority.

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE SPACE AND SPACE-RELATED PROGRAMS[a]

Fiscal Years 1977-1986
(Millions of Dollars)

Program	1982	1983	1984	1985[E]	1986[E]
TOTAL	$6,362.3	$8,510.0	$10,590.3	$12,813.8	$15,846.5
Mission-Oriented—TOTAL	1,910.9	2,670.0	2,812.9	3,072.9	3,204.1
Navigation	224.5	290.0	460.0	564.3	496.6
Communications	979.7	1,340.0	1,406.0	1,572.4	1,635.4
Warning	563.2	710.0	756.9	580.8	766.8
Mapping/Charting/Geodesy	29.2	100.0	79.9	62.1	50.2
Weather	114.3	230.0	110.1	293.3	255.1
Vehicle Development	863.8	1,070.0	1,214.2	1,465.9	1,662.0
Space Ground Support[c]	433.4	600.0	806.9	1,123.2	1,241.3
Supporting R&D[d]	755.2	900.0	1,098.7	1,149.9	2,748.2
General Support[e]	2,399.0	3,270.0	4,657.6	6,001.7	6,990.8

Program (Continued)	1977	1978	1979	1980	1981
TOTAL	$2,411.9	$2,728.8	$ 3,211.3	$ 3,848.4	4,797.1[b]
Mission-Oriented—TOTAL	989.3	904.0	860.3	977.3	1,218.2
Navigation	104.9	93.8	117.7	185.6	166.9
Communications	720.9	574.2	458.6	506.2	687.6
Warning	87.9	150.0	214.3	207.3	265.6
Mapping/Charting/Geodesy	7.7	7.3	8.5	10.3	11.6
Weather	67.9	78.7	61.2	67.9	86.5
Vehicle Development	108.3	289.6	509.6	661.0	758.5
Space Ground Support[c]	123.6	173.7	210.9	242.3	315.2
Supporting R&D[d]	209.5	296.0	434.0	427.7	586.1
General Support[e]	981.2	1,065.5	1,196.5	1,540.1	1,919.1

Source: Department of Defense, statement to Subcommittee on Science, Technology and Space of the Senate Committee on Commerce, Science and Transportation (Annually).

[a] Total obligational authority.

[b] Total subsequently revised to $4,828 million; program detail not available.

[c] Includes range support, instrumentation, ground based satellite detection, tracking, and control.

[d] Includes research, exploratory and advanced development. Includes all space-related Strategic Defense Initiative (SDI) funding, amounting to $734.2 million in FY 1985 (out of a total SDI budget of $1,397 million) and $2,321.5 million in FY 1986 (from total SDI budget request of $3,722 million).

[e] Includes support organizations as well as general operational support.

[E] Estimate. Latest year reflects Administration's budget proposal.

STRATEGIC DEFENSE INITIATIVE ORGANIZATION BUDGET PROGRAM

Fiscal Years 1984-1987
(Millions of Dollars)

Program	1984[a]	1985[E]	1986[E]	1987[E]
TOTAL	$908.2	$1,397.3	$3,722.2	$4,908.3
Surveill, Acquisit, Tracking & Kill Assess—TOTAL	$366.5	$ 546.0	$1,386.3	$1,874.9
Radar Discrimination Technology & Data Base	24.1	29.9	74.1	98.5
Optical Discrimination Technology & Data Base	50.5	133.7	198.7	192.3
Imaging Radar Technology	6.3	15.3	45.8	123.0
Imaging Laser Technology (Optical)	5.6	28.3	127.0	188.8
IR Sensor Technology	86.8	57.8	151.4	157.8
Booster Surveill & Tracking System Experiment	28.3	38.0	131.1	302.9
Space Surveillance & Tracking System Experiment	35.6	37.0	136.0	267.1
Optical Surveillance Experiment	28.8	117.0	191.6	168.0
Terminal Imaging Radar Experiment	100.5	6.0	74.6	93.0
Space-Based Imaging Experiment	—	—	5.8	11.1
Common Technology and Architecture	—	83.0	250.2	272.5
Directed Energy Weapons Technology—TOTAL	322.5	376.4	965.4	1,195.6
Space-Based Laser Concepts	157.0	162.7	371.9	507.7
Ground-Based Laser Concepts	133.1	178.2	431.5	455.2
Space-Based Particle Concepts	13.9	32.2	133.4	184.0
Nuclear Driven Directed Energy Concepts	8.5	3.4	28.6	48.7
Other DEW Efforts	10.0	—	—	—
Kinetic Energy Weapons Technology—TOTAL	195.7	256.0	859.7	1,238.6
Endoatmospheric Nonnuclear Kill Technology	111.1	68.7	100.6	86.2
Exoatmospheric Nonnuclear Kill Technology	0.1	49.1	109.7	148.4
Subsystem Engineering and Analysis	2.4	4.0	11.8	19.6
Hypervelocity Launcher Technology	6.6	19.1	68.7	100.3
Novel Concepts	2.3	9.0	29.5	29.5
Endo-NNK Interceptor Test Bed	36.8	27.6	101.9	255.1
Exo-NNK Interceptor Test Bed	24.2	12.7	120.7	185.9
Hypervelocity Launcher Development	6.6	3.5	39.3	100.4
Kinetic Kill Vehicle	5.5	30.0	147.4	221.4
Terminal Technologies Integration	0.1	32.3	130.1	91.8

(Continued on Next Page)

STRATEGIC DEFENSE INITIATIVE ORGANIZATION BUDGET PROGRAM (Continued)

Program	1984[a]	1985[E]	1986[E]	1987[E]
Systems Concepts/Battle Management—TOTAL	—	99.0	243.3	272.5
Battle Management/C^3	—	46.0	145.0	164.9
SDI Systems Architecture	—	53.0	98.2	107.7
Survivability, Lethality & Key Technologies—TOTAL	23.5	112.0	258.2	316.7
System Survivability	9.2	36.2	72.2	88.7
Lethality & Target Hardening	11.3	63.3	103.5	121.6
Space Power & Power Conversion	2.0	11.0	63.8	76.8
Space Logistics	1.0	1.5	18.7	29.6
SDIO Program Management—TOTAL	—	8.0	9.2	10.0

Source: U.S. Government, "Report to The Congress on the Strategic Defense Initiative, 1985," and Department of Defense, "R, D, T&E Programs (R-1)."

NOTE: Detail may not add to totals because of rounding.

[a] FY 1984 SDI total previously reported as $50 million, and subsequently restated to present data on a comparative basis with following years.

[E] Estimate. Latest two years represent Administration's budget proposal.

Ticketing
Phone

AIR TRANSPORTATION

For the U.S. scheduled airlines, the financial turnaround that began in 1983 strengthened in 1984 and enabled the U.S. airline industry to record its first net profit in four years. According to the Air Transport Association, the scheduled airlines achieved a net profit of $800 million on revenues of $44 billion and an operating profit of $2.2 billion. ATA reported that passenger traffic continued to show strong growth during the first half of 1985.

According to data supplied by the Department of Transportation, U.S. carriers performed well in both domestic and international operations. In domestic service, the airlines had an operating profit of $1.6 billion on revenues of $35.4 billion; the comparable figures for 1983 were an operating loss of $171 million on revenues of $31 billion. In international operations, U.S. carriers had a 1984 operating profit of $494 million (up $24 million from 1983) on revenues of $7.9 billion (up more than $700 million).

Traffic on U.S. scheduled airlines increased sharply in 1984. In domestic operations, carriers boarded 320 million passengers and flew them 243 billion passenger miles. Both figures are records; they compare with 297 million passengers flown 227 billion passenger miles in 1983. The revenue passenger load factor for domestic flights declined from 59.8 percent in 1983 to 57.7 percent in 1984. Domestic flights accounted for 93 percent of all passengers boarded in 1984, same as in the two prior years. U.S. carriers also flew 8.2 billion revenue ton miles of cargo; the figure for the previous year was 7.6 billion.

International traffic continued on the uptrend that started in 1983 after several years of decline. Passengers enplaned by U.S. carriers on international routes totaled 23.6 million, up from 21.9 million in 1983. Revenue passenger miles amounted to 61.4 billion, up from 54.9 billion in the previous year. The passenger load factor in international service was 66.2 percent, compared with 64.3 percent in 1983.

U.S. air carriers, including operators other than scheduled airlines, were flying 4,370 multi-engine aircraft at the end of 1984; the figure represents an increase of 167 planes over 1983. Turbojet aircraft numbered 2,959, about 68 percent of the total; the fleet also included 956 turboprops, 443 piston engine aircraft and 12 helicopters.

Worldwide commercial air traffic also experienced substantial growth in 1984. Airlines of the 152 member states of the International Civil Aviation Organization (ICAO) boarded 832 million passengers, an increase of five percent over the 1983 figure of 795 million; they flew 780 billion passenger miles, 42 billion more than in 1983. Passenger load factor in 1984 was 65 percent, up from 64 percent in the three prior years. Traffic growth was fairly even in all regions of the world, ICAO said, reflecting a general economic upturn. World airlines, excluding Soviet domestic service, recorded an operating profit of $5 billion on revenues of $105 billion; the net result, which takes into account interest, taxes, and other non-operating expenses, was not available at publication time, but the evidence suggests that the world's airlines as a whole may have recorded black figures after four years in the red.

The world fleet of turbine-engine aircraft in airline service increased by more than 600 airplanes, according to annual survey results published by Exxon International. The gain was due in part to an increase in the number of airlines surveyed, which grew from 687 to 766. As of March 31, 1984, the world fleet—excluding planes operated by the Soviet Union—totaled 10,248 aircraft, which compares with 9,643 a year earlier. The 1984 figure included 6,802 turbojets, 3,191 turboprops and 255 turbine-powered helicopters.

Of the total, 65.7 percent were of U.S. manufacture, down from 66.8 percent in the previous survey. U.S. plane builders produced 83.7 percent of all the turbojet-powered aircraft in service; that figure was also down, from 84.5 percent in 1983. U.S. manufacturers built only 26.9 percent of the turboprops in the fleet; the 1984 percentage was the same as in the previous year. The sharpest drop was in the helicopter category; 68.2 percent were of American origin, compared with 83.1 percent in 1983.

At the end of 1984, the U.S. air transportation system included 16,075 civil and joint civil/military-use airfield facilities in the U.S., Puerto Rico and the U.S. Virgin Islands. The figure represented a gain of 46 facilities over year-end 1983. Texas led the list with 1,566 facilities, followed by Illinois (901) and California (881).

AIR CANADA
American
American

OPERATING REVENUES AND EXPENSES OF WORLD SCHEDULED AIRLINES[a]

Calendar Years 1979-1984
(Millions of U.S. Dollars)

	1979	1980	1981	1982	1983	1984[p]
OPERATING REVENUES:						
Scheduled Services:						
Passenger	$56,483	$69,930	$74,433	$74,860	$77,600	
Freight	7,709	9,468	9,523	9,560	9,630	NA
Mail	1,141	1,501	1,425	1,480	1,470	
Total Schedule Services	$65,333	$80,899	$85,381	$85,900	$88,700	
Non-Scheduled Services	2,418	3,149	3,682	3,100	2,800	
Incidental	3,003	3,628	3,929	4,240	5,600	
Total Operating Revenues	$70,755	$87,676	$92,992	$93,240	$97,100	$105,000
OPERATING EXPENSES:						
Flight Operations	$24,045	$34,345	$36,676	$34,600	$32,640	
Maintenance & Overhaul	8,013	9,283	9,640	9,150	9,520	
Depreciation & Amortization	4,699	5,449	5,968	6,330	6,850	NA
User Charges & Station Expenses	11,895	13,713	13,828	14,540	15,080	
Passenger Services	6,718	7,967	8,085	8,540	8,810	
Ticketing, Sales & Promotion	10,390	12,484	13,800	14,510	15,640	
General, Administrative & Other	4,258	5,069	5,687	5,730	6,660	
Total Operating Expenses	$70,019	$88,310	$93,684	$93,400	$95,200	$100,000
OPERATING RESULT	$ 736	$ (635)	$ (692)	$ (160)	$ 1,900	$ 5,000
Percent of Revenue	1.0%	(0.7%)	(0.7%)	(0.2%)	2.0%	4.8%
NET RESULT[b]	$ 588	$ (919)	$(1,150)	$(1,300)	$(800)	NA
Percent of Revenue	0.8%	(1.0%)	(1.2%)	(1.4%)	(0.8%)	NA

Source: International Civil Aviation Organization.

NOTE: Data in parentheses represent negative values.

[a] Excludes domestic operations in the USSR.

[b] Net Result equals Operating Result minus non-operating items, including interest, income taxes, retirement of property and equipment, affiliated companies and subsidies.

NA Not available.

[p] Preliminary.

TRAFFIC STATISTICS
WORLD AIRLINE SCHEDULED SERVICE[a]
Calendar Years 1970-1984

Year	Passengers Carried	Freight Tons Carried	Passenger-Miles Performed	Seat-Miles Available	Passenger Load Factor	Ton-Miles Performed		
						Freight	Mail	TOTAL (Passengers & Baggage, Freight, Mail)
	(Millions)		(Billions)		(Percent)	(Millions)		
1970	383	6.7	286	522	55%	8,230	2,110	38,820
1971	411	7.4	307	568	54	9,060	1,990	41,420
1972	450	8.0	348	610	57	10,290	1,900	46,690
1973	489	9.0	384	667	58	12,010	1,970	51,900
1974	515	9.6	407	688	59	13,030	1,970	55,270
1975	534	9.6	433	733	59	13,270	1,990	58,080[r]
1976	576	10.3	475	789	60	14,750	2,080	63,880
1977	610	11.0[r]	508	836	61	16,180	2,180	68,790
1978	679	11.7	582	902	65	17,770	2,240	77,770
1979	754	12.1	659	999	66	19,180	2,350	86,900
1980	748	12.1	677	1,071[r]	63	19,950	2,520	89,540[r]
1981[r]	752	11.9	695	1,091	64	20,970	2,600	92,620
1982[r]	764	12.6	710	1,114	64	21,400	2,660	94,600
1983[r]	795	13.2	738	1,148	64	24,620	2,750	99,670
1984[p]	832	14.4	780	1,206	65	27,010	2,950	107,930

Source: International Civil Aviation Organization (ICAO).

[a] Includes international and domestic traffic on scheduled service performed by the airlines of the 152 States which were members of ICAO in 1983.

[r] Revised.

[p] Preliminary.

OPERATING REVENUES AND EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1960-1984
(Millions of Dollars)

Year	TOTAL OPERATIONS[b]			Domestic Operations			International Operations		
	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)
1960	$ 2,884	$ 2,807	$ 78	$ 2,178	$ 2,141	$ 37	$ 706	$ 666	$ 40
1961	3,064	3,043	20	2,305	2,307	(2)	759	737	22
1962	3,439	3,249	190	2,589	2,488	100	850	760	90
1963	3,759	3,479	280	2,790	2,646	144	969	833	136
1964	4,251	3,781	470	3,169	2,849	320	1,082	932	150
1965	4,958	4,286	672	3,691	3,239	452	1,267	1,047	220
1966	5,745	4,970	775	4,171	3,670	502	1,574	1,300	274
1967	6,865	6,157	708	4,981	4,560	421	1,884	1,597	287
1968	7,753	7,248	505	5,691	5,397	295	2,062	1,852	210
1969	8,791	8,403	387	6,936	6,613	322	1,855	1,790	65
1970	9,290	9,247	43	7,180	7,181	(1)	2,109	2,066	44
1971	10,046	9,717	328	7,753	7,496	257	2,292	2,221	71
1972	11,163	10,578	584	8,652	8,158	493	2,512	2,420	91
1973	12,419	11,834	585	9,694	9,200	494	2,725	2,633	91
1974	14,703	13,978	725	11,546	10,761	785	3,157	3,218	(60)
1975	15,356	15,229	128	12,020	11,902	117	3,336	3,326	11
1976	17,503	16,781	721	13,899	13,324	575	3,605	3,457	147
1977	19,926	19,018	908	15,822	15,166	657	4,104	3,852	252
1978	22,892	21,527	1,366	18,189	17,172	1,018	4,703	4,355	348
1979	27,227	27,028	199	21,652	21,523	129	5,575	5,505	69
1980	33,728	33,949	(222)	26,404	26,409	(6)	6,543	6,766	(223)
1981	36,211	36,612	(401)	28,788	29,051	(264)	6,390	6,574	(184)
1982	36,066	36,804	(739)	28,728	29,478	(750)	6,435	6,452	(17)
1983[r]	38,593	38,231	362	31,014	31,186	(171)	7,163	6,693	470
1984	43,790	41,662	2,128	35,373	33,787	1,587	7,872	7,378	494

Source: U.S. Department of Transportation Office of Aviation Information Management, Financial Data Branch.

NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] For 1980 and subsequent years, includes 'Other' operations not reported as 'Domestic' or 'International.'

[r] Revised.

SOURCES OF OPERATING REVENUES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1970-1984 (Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger Service[b]	Mail[c]	Freight[b] & Air Express	Excess Baggage	Other[c]
DOMESTIC OPERATIONS						
1970	$ 7,180	$ 6,359	$206	$ 516	$12	$ 87
1971	7,753	6,849	227	549	14	114
1972	8,652	7,686	230	618	13	105
1973	9,694	8,518	263	703	14	196
1974	11,546	9,903	264	772	17	589
1975	12,020	10,301	253	792	19	655
1976	13,899	12,104	294	942	22	537
1977	15,822	13,773	355	1,109	21	564
1978	18,189	15,753	336	1,347	23	730
1979	21,652	18,931	417	1,485	28	791
1980	26,404	23,317	446	1,582	32	1,027
1981	28,788	25,504	497	1,659	36	1,091
1982	28,728	25,440	524	1,505	42	1,218
1983[r]	31,014	27,519	516	1,602	52	1,326
1984	35,373	31,429	548	1,707	70	1,619
INTERNATIONAL OPERATIONS						
1970	$ 2,109	$ 1,630	$145	$ 286	$15	$ 34
1971	2,292	1,731	124	385	16	37
1972	2,512	1,906	110	449	14	32
1973	2,725	2,112	109	438	15	51
1974	3,157	2,353	118	542	21	122
1975	3,336	2,469	122	591	25	129
1976	3,605	2,665	112	626	27	175
1977	4,104	3,047	112	710	21	215
1978	4,703	3,534	117	750	20	282
1979	5,575	4,271	131	837	23	313
1980	6,543	4,984	175	1,011	25	348
1981	6,390	4,917	165	984	25	299
1982	6,435	4,959	177	990	25	284
1983[r]	7,163	5,605	152	999	23	384
1984	7,872	6,046	158	1,169	27	471

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.

NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] Scheduled and charter.

[c] Subsidy included with Mail through 1979, and then included in Other, which also includes revenues not related to transport, plus, beginning in 1981, transport revenues not specifically broken out by category by some small carriers.

[r] Revised.

OPERATING EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1970-1984
(Millions of Dollars)

Year	TOTAL Operating Expenses	Flying Operations	Maintenance	Passenger Service	Aircraft & Traffic Servicing	Promotion and Sales	Depreciation & Amortization	Other[b]
DOMESTIC OPERATIONS								
1970	$ 7,181	$ 2,119	$1,136	$ 707	$1,311	$ 811	$ 750	$ 347
1971	7,496	2,255	1,130	742	1,394	839	754	382
1972	8,158	2,348	1,246	855	1,578	943	778	411
1973	9,200	2,638	1,408	968	1,835	1,057	839	456
1974	10,761	3,345	1,514	1,027	2,026	1,178	871	799
1975	11,902	3,919	1,611	1,117	2,158	1,271	891	936
1976	13,324	4,448	1,816	1,260	2,443	1,495	927	935
1977	15,166	5,288	2,001	1,461	2,728	1,713	967	1,008
1978	17,172	5,669	2,155	1,711	3,120	2,040	1,231	1,246
1979	21,523	7,998	2,457	2,091	3,702	2,564	1,373	1,337
1980	26,409	11,029	2,758	2,329	4,051	3,096	1,586	1,560
1981	29,051	12,037	2,822	2,522	4,497	3,708	1,723	1,742
1982	29,478	11,529	2,709	2,668	4,665	4,160	1,876	1,869
1983[r]	31,186	11,370	2,878	2,983	5,104	4,764	2,107	1,980
1984	33,787	12,151	3,173	3,192	5,369	5,310	2,221	2,371
INTERNATIONAL OPERATIONS								
1970	$ 2,066	$ 586	$ 266	$ 233	$ 365	$ 301	$ 202	$ 113
1971	2,221	646	287	248	395	313	206	126
1972	2,420	674	325	271	434	351	225	140
1973	2,633	752	338	302	501	368	225	148
1974	3,218	1,136	381	295	538	386	230	252
1975	3,326	1,175	392	292	565	422	225	254
1976	3,457	1,215	399	300	597	473	205	268
1977	3,852	1,303	450	351	668	526	253	301
1978	4,355	1,351	498	427	768	623	323	363
1979	5,505	1,960	571	538	922	774	352	388
1980	6,766	2,775	616	600	1,049	917	385	423
1981	6,574	2,757	540	583	932	945	382	435
1982	6,452	2,596	512	577	893	954	396	525
1983[r]	6,693	2,490	548	664	936	1,162	389	505
1984	7,378	2,607	656	749	975	1,308	445	638

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.
NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] General and administrative, and other transport-related expenses.

[r] Revised.

U.S. AIR CARRIERS
TOTAL ASSETS AND INVESTMENT IN EQUIPMENT

Calendar Years 1964-1984
(Millions of Dollars)

Year	TOTAL Assets	Value of Flight Equipment	Value of Ground Property & Equipment, & Other[a]	Less: Reserves for Depreciation & Overhaul	Equals: Net Value of Owned Operating Property & Equipment	Investment in Operating Property and Equipment as a Percent of Total Assets
1964	$ 4,602	$ 4,524	$ 614	$ 2,109	$ 3,029	65.8%
1965	5,581	5,024	716	2,241	3,499	62.7
1966	7,310	6,096	856	2,457	4,495	61.5
1967	9,344	7,568	1,064	2,773	5,859	62.7
1968	10,992	9,021	1,269	3,009	7,281	66.2
1969	12,069	9,943	1,516	3,560	7,899	65.4
1970	12,913	10,950	1,951	4,120	8,782	68.0
1971	12,998	11,221	2,028	4,649	8,600	66.2
1972	13,635	11,918	2,225	5,115	9,028	66.2
1973	14,464	12,908	2,424	5,693	9,639	66.6
1974	15,200	13,538	2,539	6,252	9,826	64.6
1975	15,064	14,035	2,635	6,823	9,847	65.4
1976	15,454	14,399	2,792	7,585	9,605	62.2
1977	16,869	14,822	2,997	8,141	9,679	57.4
1978	20,745	16,127	3,367	8,799	10,696	51.6
1979	24,907	18,561	3,985	9,746	12,800	51.4
1980	28,900	20,859	4,682	10,309	15,233	52.7
1981	30,513	22,375	5,175	11,028	16,521	54.1
1982	31,525	23,786	5,424	11,405	17,804	56.5
1983[r]	35,213	26,588	6,191	12,910	19,868	56.4
1984	36,458	27,755	6,534	13,961	20,328	55.8

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.

[a] Includes land and construction in progress.

[r] Revised.

TRAFFIC STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE[a]
Calendar Years 1960-1984

Year	Revenue Ton Miles (Millions)			Total Available Ton Miles (Millions)	Total Revenue Load Factor	Aircraft Revenue Miles (Millions)	Average Over-All Flight Stage Length (Miles)	Average Available Seats per Aircraft Mile
	Passenger	Cargo[b]	Total					
1960	3,733	996	4,729	9,001	52.5%	998	259	69
1961	3,827	1,144	4,971	10,041	49.5	970	259	79
1962	4,210	1,360	5,570	11,468	48.6	1,010	276	86
1963	4,839	1,507	6,346	13,257	47.9	1,095	289	91
1964	5,630	1,803	7,434	15,514	47.9	1,189	301	93
1965	6,629	2,356	8,986	18,408	48.8	1,354	322	96
1966	7,736	2,949	10,686	20,939	51.0	1,482	339	98
1967	9,561	3,475	13,036	26,968	48.3	1,834	371	101
1968	11,023	4,226	15,249	33,221	45.9	2,146	401	107
1969	12,197	4,701	16,898	38,664	43.7	2,385	443	112
1970	13,171	4,994	18,166	41,693	43.6	2,426	473	117
1971	13,565	5,120	18,685	44,139	42.3	2,378	476	125
1972	15,241	5,506	20,746	45,583	45.5	2,376	471	129
1973	16,196	6,046	22,242	49,019	45.4	2,448	477	135
1974	16,292	6,133	22,425	46,848	47.9	2,258	478	140
1975	16,281	5,905	22,186	47,254	46.9	2,241	476	143
1976	17,899	6,222	24,121	49,325	48.9	2,320	480	146
1977	19,322	6,587	25,909	52,284	49.6	2,419	490	149
1978	22,678	7,001	29,679	54,765	54.2	2,520	502	152
1979	26,202	7,189	33,390	60,844	54.9	2,791	517	154
1980	25,519	7,084	32,603	62,983	51.8	2,816	526	158
1981	24,889	7,060	31,949	61,186	52.2	2,703	519	161
1982	25,964	6,886	32,850	62,401	52.6	2,699	544	167
1983[r]	28,183	7,573	35,756	65,385	54.7	2,809	558	169
1984	30,446	8,169[b]	38,615	72,024	53.6	3,114	577	169

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.
NOTE: Detail may not add to totals because of rounding.
[a] Includes international and domestic operations.
[b] Includes freight, air express, U.S. and foreign mail.
[r] Revised.

PASSENGER STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE
DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1970-1984

Year	Revenue Passenger Enplanements (Thousands)	Average Passenger Trip-Length (Miles)	Revenue Passenger Miles (Millions)	Available Seat Miles (Millions)	Revenue Passenger Load Factor[a]
DOMESTIC OPERATIONS					
1970	153,662	679	104,147	213,160	48.9%
1971	156,195	681	106,438	221,503	48.1
1972	172,452	685	118,138	226,614	52.1
1973	183,272	689	126,317	244,699	51.6
1974	189,733	684	129,732	233,880	55.5
1975	188,746	698	131,728	241,282	54.6
1976	206,279	704	145,271	261,248	55.6
1977	222,283	705	156,609	280,619	55.8
1978	253,957	719	182,669	299,542	61.0
1979	292,700	714	208,891	332,796	62.8
1980	272,829	736	200,829	346,028	58.0
1981	265,304	749	198,715	346,172	57.4
1982	274,342	766	210,149	359,528	58.5
1983[r]	296,721	765	226,909	379,150	59.8
1984	319,650	761	243,104	421,309	57.7
INTERNATIONAL OPERATIONS					
1970	16,260	1,695	27,563	51,960	53.0%
1971	17,474	1,672	29,219	58,320	50.1
1972	18,897	1,813	34,268	60,797	56.4
1973	18,936	1,882	35,640	65,898	54.1
1974	17,725	1,872	33,186	63,126	52.6
1975	16,316	1,905	31,082	61,724	50.4
1976	17,039	1,979	33,717	61,574	54.8
1977	18,043	2,029	36,610	64,947	56.4
1978	20,759	2,125	44,112	69,209	63.7
1979	24,163	2,199	53,132	83,330	63.8
1980	24,074	2,258	54,363	86,507	62.8
1981	20,672	2,427	50,173	78,725	63.7
1982	19,760	2,505	49,495	80,591	61.4
1983[r]	21,917	2,506	54,920	85,388	64.3
1984	23,614	2,598	61,355	92,701	66.2

Source: U.S. Department of Transportation, Office of Aviation Information Management, Financial Data Branch.

[a] Revenue passenger miles as a percent of available seat miles.

[r] Revised.

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

By Model
Years 1980-1984

	1980	1981	1982	1983	1984
TOTAL AIRCRAFT IN SERVICE	8,010	8,726	9,220	9,643	10,248
Turbojets—TOTAL	5,756	6,085	6,275	6,462	6,802
Aerospatiale SE-210 Caravelle	102	119	93	105	100
Aerospatiale SN-601 Corvette	13	11	11	10	12
Airbus A300	102	132	168	206	220
Airbus A310	—	—	—	4	29
B.Ae. 111	158	159	156	155	154
B.Ae. 146	—	—	—	—	10
B.Ae. HS-125	6	6	9	9	10
B.Ae. VC-10	6	1	—	—	—
B.Ae./Aerospatiale Concorde	13	14	14	14	14
B.Ae. Comet	4	—	—	—	—
B.Ae. Trident	64	86	71	71	65
Boeing 707/720	569	547	512	435	365
Boeing 727	1,560	1,585	1,636	1,602	1,696
Boeing 737	593	708	779	879	940
Boeing 747	420	478	517	533	556
Boeing 757	—	—	—	10	33
Boeing 767	—	—	—	37	79
Cessna 500/550 Citation I/II	13	37	25	22	26
Convair 880/990	14	12	13	15	14
Dassault Falcon 10/20/50	33	45	40	46	43
Dassault Mercure	10	10	10	10	10
Fokker F-28 Fellowship	115	128	133	124	151
Gates Learjet	14	35	21	27	27
Gulfstream II/III G-1159	8	12	16	14	15
Ilyushin IL-62	41	39	47	47	48
Ilyushin IL-76	6	2	11	17	37
Israel Aircraft 1121/1124	—	5	10	12	9
Lockheed L-1329 JetStar	1	4	7	7	8
Lockheed L-1011 TriStar	177	192	215	224	231
MBB Hansa HFB-320	6	5	—	—	1
McDonnell Douglas DC8	382	358	301	336	337
McDonnell Douglas DC-9/ MD-80	856	882	941	971	1,021
McDonnell Douglas DC-10	307	338	342	346	346
Rockwell/Sabreliner 60	2	—	—	—	1
Tupolev Tu-124	2	—	2	2	—
Tupolev Tu-134	82	68	89	86	95
Tupolev Tu-154	33	31	38	39	47
VFW-Fokker 614	2	5	—	—	—
Yakolev Yak-40/42	42	31	48	47	52
Turboprops—TOTAL	2,059	2,508	2,697	2,956	3,191
Aerospatiale N.262 Mohawk 298	30	29	22	30	35
Antonov An.12	10	3	8	8	11
Antonov An.24/26/30	125	97	149	159	152
B.Ae. HP-137 Jetstream	3	17	17	18	33

(Continued on next page)

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET (Continued)

By Model

1980-1984

	1980	1981	1982	1983	1984
Turboprops (continued)					
B.Ae. Vanguard	11	8	9	8	10
B.Ae. Viscount	84	77	78	67	94
B.Ae. HS-748	141	144	151	154	151
Beech 99	107	123	128	146	163
Beech 90 King Air	15	16	20	24	29
Beech 100 King Air	—	—	8	7	8
Beech 200 King Air	—	20	22	44	43
Beech 18-TP Conv.	5	—	—	1	6
Beech 1900	—	—	—	—	5
Bristol 175 Britannia	10	12	10	8	7
Canadair CL-44	12	10	8	12	17
CASA/Nurtanio C-212 Aviocar	9	34	60	66	91
Cessna 400 Srs. TP Conv.	2	—	—	—	—
Cessna 425/441 Conquest I/II	—	2	6	13	16
Convair 580/600/640	132	147	156	156	141
DHC-2 Turbo Beaver	11	8	8	11	11
DHC-5 Buffalo	—	—	—	2	2
DHC-6 Twin Otter	321	456	449	464	488
DHC-7 Dash 7	18	38	59	78	85
Dornier DO 128 Turbo-Skyservant	—	—	1	1	1
Dornier DO-228	—	—	—	5	18
Douglas DC-3T Turbo Express	—	—	—	—	1
Embraer EMB-110 Bandeirante	60	157	189	220	232
Fokker/Fairchild F-27/FH-227 Friendship	363	402	377	405	411
GAF Nomad	9	34	42	34	25
Grumman G-159 Gulfstream I	8	16	15	20	23
Grumman G-73 Turbo Mallard	—	1	1	6	6
Grumman G-21C Turbo Goose	3	2	2	1	—
Handley Page Herald	34	31	34	34	27
Hawker-Siddeley Argosy	8	5	5	7	7
Ilyushin IL-18	79	61	72	74	75
Israel Aircraft Arava 101B	—	—	3	5	1
LET L-410	11	11	—	—	—
Lockheed L-188 Electra	89	96	88	85	84
Lockheed L-100/L-382 Hercules	41	48	49	51	59
Mitsubishi MU-2B	10	13	13	17	17
NAMC YS-11	112	117	114	113	118
Pilatus PC-6 Turbo Porter	7	5	8	9	27
Pilatus Britten-Norman BN-2T Turbo Islander	—	—	—	—	5
Piper PA-31T/42 Cheyenne	1	6	8	10	12
Piper T-1040	—	—	—	1	4
Rockwell Turbo Commander	1	12	9	10	8
Saunders ST-27	11	5	9	9	10
Shorts SC-5 Belfast	—	—	3	5	5

(Continued on next page)

TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET (Continued)

By Model
1980-1984

	1980	1981	1982	1983	1984
Turboprops (continued)					
Shorts SC-7 Skyliner/Skyvan	22	29	36	37	34
Shorts 330	36	63	72	88	81
Shorts 360	—	—	—	7	41
Swearingen Merlin	3	6	4	2	17
Swearingen Metro	108	143	169	218	234
Transall C-160	—	5	6	6	9
Xian (Antonov) Y-7	—	—	—	—	1
Turbine-Powered Helicopters—TOTAL	195	133	248	225	255
Aerospatiale SA-315 Lama	—	2	3	7	5
Aerospatiale SA-316 Alouette III	—	—	—	3	12
Aerospatiale SA-318 Alouette II	7	7	2	1	2
Aerospatiale SA-319 Alouette III Astazou	—	—	—	1	2
Aerospatiale SA-321 Super Frelon	1	—	—	—	—
Aerospatiale (Nurtanio) SA-330 Puma	17	3	2	—	19
Aerospatiale AS-332 Super Puma	—	1	1	1	5
Aerospatiale SA-341 Gazelle	—	1	2	—	—
Aerospatiale AS-350 Ecureuil/AStar	—	—	1	3	5
Aerospatiale AS-355 Ecureuil 2/Twinstar	—	—	2	1	2
Aerospatiale SA-360 Dauphin	—	7	7	8	8
Aerospatiale SA-365 Dauphin II	—	—	—	1	8
Bell (Agusta/Fuji) 204	5	4	13	10	12
Bell 205	1	—	6	6	6
Bell 206 Jetranger/Longranger	26	7	81	35	32
Bell 212	7	5	15	15	14
Bell (Fuji) 214/214ST	4	3	4	7	7
Bell 412	—	—	—	—	1
Boeing Vertol 234 Chinook	—	1	6	6	6
Hughes (Kawasaki) 500	72	24	24	30	22
M.B.B./Nurtanio Bo. 105	4	11	9	7	7
Mil Mi-8	3	—	—	—	—
Sikorsky S-55T	—	3	3	3	3
Sikorsky S-58T	8	9	13	15	14
Sikorsky S-61	35	34	42	44	42
Sikorsky S-62	—	1	—	—	—
Sikorsky S-64	—	1	—	—	—
Sikorsky S-76	5	9	11	16	15
Westland 30	—	—	1	5	6

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).
NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and covers aircraft in service as of March 31 since 1982, and as of June 30 for prior years. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled services. As of 1984, the survey included 766 airlines.

U.S. TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

Calendar Years 1980-1984

	1980	1981	1982	1983	1984
TOTAL AIRCRAFT IN SERVICE	8,010	8,726	9,220	9,643	10,248
Number Manufactured in U.S.	5,590	5,927	6,228	6,440	6,728
Percent Manufactured in U.S.	69.8%	67.9%	67.5%	66.8%	65.7%
Turbojet Aircraft in Service	5,756	6,085	6,275	6,462	6,802
Number Manufactured in U.S. ..	4,916	5,188	5,325	5,458	5,695
Percent Manufactured in U.S. ..	85.4%	85.3%	84.9%	84.5%	83.7%
Turboprop Aircraft in Service ...	2,059	2,508	2,697	2,956	3,191
Number Manufactured in U.S. ..	515	638	685	795	859
Percent Manufactured in U.S. ..	25.0%	25.4%	25.4%	26.9%	26.9%
Turbine-Powered Helicopters In Service	195	133	248	225	255
Number Manufactured in U.S. ..	159	101	218	187	174
Percent Manufactured in U.S. ..	81.5%	75.9%	87.9%	83.1%	68.2%

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).

NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and includes aircraft in service as of March 31 since 1982, and as of June 30 for prior years. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled service. As of 1984, the survey included 766 airlines.

JET FUEL COSTS AND CONSUMPTION BY U.S. AIR CARRIERS[a]

Calendar Years 1970-1984

Year	Gallons Consumed (Millions)	Total Cost (Millions)	Cost Per Gallon (Cents)	Cost Index (1972 = 100)	Cost of Fuel as Percent of Cash Operating Expenses
1970	9,675.3	$1,062.5	11.0¢	94.2	12.7%
1971	9,897.8	1,117.5	11.3	96.9	12.6
1972	10,043.7	1,170.3	11.7	100.0	12.0
1973	10,652.9	1,357.6	12.7	109.4	12.1
1974	9,520.8	2,320.4	24.4	209.2	17.3
1975	9,460.0	2,764.1	29.2	250.8	19.0
1976	9,785.9	3,103.2	31.7	272.2	19.3
1977	10,228.0	3,708.1	36.3	311.1	20.2
1978	10,558.0	4,148.2	39.3	337.2	19.8
1979	11,211.9	6,465.3	57.7	494.9	24.5
1980	10,839.7	9,736.2	89.8	770.8	29.9
1981	10,082.0	10,491.5	104.1	893.1	29.6
1982	9,935.4	9,755.2	98.2	842.6	27.4
1983	10,207.8	9,073.1	88.9	762.8	24.7
1984	11,095.9	9,428.3	85.0	729.2	24.1

Source: Air Transport Association of America

[a] Includes Majors and Nationals, per CAB classifications effective 1981, corresponding to previous categories of System Trunks and Local Service Carriers. Revised from previously reported data. Air Florida, Capitol and Transamerica not included in 1984 data, and excluded from prior year data for comparability.

U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES[a] BY TYPE AND STATE

As of December 31, 1984

State	TOTAL[a]	Public[b]	Paved	Lighted	State	TOTAL[a]	Public[b]	Paved	Lighted
Alabama	172	103	127	100	Nevada	123	67	55	27
Alaska	609	439	57	112	New Hampshire	54	28	31	2
Arizona	243	79	125	68	New Jersey	294	67	115	64
Arkansas	156	98	97	79	New Mexico	167	76	74	50
California	881	283	604	269	New York	480	194	189	136
Colorado	315	93	147	99	N. Carolina	288	131	119	107
Connecticut	104	28	59	29	N. Dakota	457	106	71	89
Delaware	36	12	12	15	Ohio	689	220	246	199
Dist. of Col.	15	2	12	5	Oklahoma	335	175	174	137
Florida	542	138	219	152	Oregon	336	111	131	84
Georgia	301	118	158	121	Pennsylvania	708	173	244	163
Hawaii	51	14	39	12	Rhode Island	18	7	11	7
Idaho	198	121	67	44	S. Carolina	139	72	65	63
Illinois	901	122	193	175	S. Dakota	165	77	49	75
Indiana	495	127	130	118	Tennessee	171	88	105	83
Iowa	282	157	127	152	Texas	1,566	417	749	419
Kansas	384	158	124	148	Utah	97	51	61	43
Kentucky	129	76	87	63	Vermont	60	20	17	8
Louisiana	317	97	168	77	Virginia	274	85	119	86
Maine	143	80	41	32	Washington	385	142	170	130
Maryland	149	47	66	50	W. Virginia	92	42	52	33
Massachusetts	129	53	81	42	Wisconsin	413	154	129	136
Michigan	427	230	165	170	Wyoming	101	47	44	34
Minnesota	480	162	112	140	**50 States-Total**	16,009	5,881	6,486	4,868
Mississippi	180	98	98	80	Puerto Rico	31	11	27	10
Missouri	423	158	169	143	Virgin Islands	7	2	3	2
Montana	194	127	83	82	S. Pacific[c]	28	25	13	9
Nebraska	341	111	99	98	**TOTAL**	16,075	5,919	6,529	4,889

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

[a] 16,029 aircraft facilities consist of 12,653 airports (5,628 for public use and 7,025 for private use), 2,918 heliports (124 for public use and 2,794 for private use), 66 stolports (10 for public use and 56 for private use), and 392 seaplane bases (225 for public use and 167 for private use). Included in these data are facilities having joint civil-military use.

[b] 'Public' refers to use, whether publicly or privately owned.

[c] American Samoa, Guam, and Trust Territories.

ACTIVE MULTI-ENGINE U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model
Active as of December 1980-1984

	1980	1981	1982	1983	1984
TOTAL	3,808	3,970[r]	4,072[r]	4,203	4,370
Turbojets—TOTAL	2,531	2,511	2,674	2,767	2,959
Four-Engine—TOTAL	441	365	354	309	349
Boeing 707/720	149	68	56	25	22
Boeing 747	144	147	144	146	156
B.Ae. 146	—	—	—	3	14
B.Ae. Aerospatiale Concorde	—	—	—	—	—
Convair 880(22)/990(30)	6	6	3	2	—
McDonnell Douglas DC-8	142	144	151	133	157
Three-Engine—TOTAL	1,347	1,363	1,387	1,393	1,438
Boeing 727	1,092	1,096	1,110	1,122	1,161
Lockheed L-1011	102	106	111	116	103
McDonnell Douglas DC-10	153	161	166	155	174
Twin-Engine—TOTAL	743	783	933	1,065	1,172
Airbus A-300	19	25	30	34	38
Boeing 737	220	236	290	348	391
Boeing 757	—	—	2	15	19
Boeing 767	—	—	13	49	53
B.Ae. BAC-111	27	27	36	36	33
Canadair CL600	—	—	1	—	—
Cessna C500 Citation I	5	1	2	1	1
Dassault MD-20, Falcon	42	27	23	12	11
Fokker F-28	5	9	11	6	23
Grumman G-1159	5	3	2	1	1
Hamburger Flugzeugbau HF-320	—	—	—	1	—
Hawker-Siddeley HS125	—	—	2	—	—
Israel Westwind 1123/1124	1	—	1	—	—
Learjet LR-23/LR-24	5	3	4	—	—
Learjet LR-25	7	1	—	—	—
Learjet LR-35	3	—	3	4	8
Learjet LR36	—	—	1	—	—
McDonnell Douglas DC-9/MD-80	394	447	509	557	594
Rockwell NA-265 Sabreliner	2	—	1	—	—
Sud Aviation SE210 Caravelle	5	2	2	1	—
Sud Aviation SN601	3	2	—	—	—
Turboprops—TOTAL	682	852	826	876	956
Four-Engine—TOTAL	92	105	116	99	109
Canadair CL44D	2	4	4	2	5
De Havilland DHC-7	18	29	43	46	46
Lockheed 188 Electra	52	51	47	37	34
Lockheed 382/L-100 Hercules	20	20	19	11	22
Vickers V745	—	1	3	3	2

(Continued on next page)

ACTIVE MULTI-ENGINE U.S. AIR CARRIER FLEET

By Type of Aircraft, Number of Engines and Model (Continued)

	1980	1981	1982	1983	1984
Twin-Engine—TOTAL	590	747	710	777	847
Beech BE1900	—	—	—	—	17
Beech BE99	87	102	108	101	85
Beech BE90	2	2	4	2	2
Beech BE200	1	2	2	4	6
Beech STC 18	—	—	—	1	1
Beech 100	—	—	—	1	2
CASA C212 Aviocar	2	15	16	28	27
Cessna C441	1	—	2	1	3
Convair 580/600/640	119	251	98	100	107
DeHavilland DHC-6	107	96	101	112	107
Embraer EMB110	34	66	83	83	81
Fairchild/Fokker F-27/FH-227	15	16	23	35	46
Fairchild Swearingen SA-226	100	72	105	99	121
Fairchild Swearingen SA-227	—	4	26	55	70
GAF N22/N24 Nomad	9	3	2	—	—
Grumman G-73	—	1	4	4	—
Grumman G-159	16	17	19	16	21
Handley Page HP-137	15	12	12	10	10
Hawker-Siddeley HS748	2	2	5	5	2
Israel Aircraft AR101B	—	2	3	—	—
Mitsubishi MU-2	—	—	—	2	1
Nihon YS-11	22	27	27	35	30
Nord ND-262/STC-262	22	15	15	9	14
Piper PA31T	—	1	1	6	8
Rockwell Aero Commander 690	—	—	—	1	4
Saab-Fairchild SF340A	—	—	—	—	3
Short SD-3/SD-330	34	39	52	66	78
Short SC-7	2	2	2	1	1
Piston-Engine—TOTAL	593	606	569	551	443
Four-Engine—TOTAL	73	68	57	52	50
DeHavilland DHC-114	27	21	16	11	6
Douglas DC-4	5	6	3	3	3
Douglas DC-6	41	41	38	38	41
Lockheed 1049	—	—	—	—	—
Three-Engine—TOTAL	—	—	—	—	4
Pilatus Britten-Norman BN2A-MK.3 Trislander	—	—	—	—	4
Twin-Engine—TOTAL	520	535	510	499	389
Helicopters—TOTAL	2	4	5	9	12

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Effective 1978, includes certified route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters. "Active aircraft" must have a current U.S. registration and have been flown during the calendar year.

[a] Aircraft in use by foreign airlines and registered in the United States to carry passengers between two U.S. cities.

[r] Revised. Data in previous editions included single-engine piston aircraft.

ACTIVE U.S. CIVIL AIRCRAFT[a]

As of December 31, 1960-1983

Year	TOTAL	Air Carrier[b]	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotorcraft[c]	Other[d]
				Multi-Engine	Single-Engine			
					4-place & over	3-place & less		
1960	78,684	2,135	76,549	7,243	34,829	33,472	634	371
1961	82,736	2,104	80,632	8,401	38,206	32,800	798	427
1962	86,168	2,047	84,121	9,186	41,120	32,341	967	507
1963	87,167	2,079	85,088	9,695	42,647	30,977	1,171	588
1964	90,823	2,081	88,742	10,644	45,777	30,367	1,306	648
1965	97,567	2,125	95,442	11,977	49,789	31,364	1,503	809
1966	106,978	2,272	104,706	13,548	52,972	35,687	1,622	877
1967	116,638	2,452	114,186	14,651	56,865	39,675	1,899	1,096
1968	126,823	2,586	124,237	16,760	60,977	42,830	2,350	1,320
1969	133,496	2,690	130,806	18,111	63,703	45,001	2,557	1,434
1970	134,422	2,679	131,743	18,291	64,759	44,884	2,255	1,554
1971	133,790	2,642	131,148	17,855	64,464	44,792	2,352	1,685
1972	147,593	2,583	145,010	19,849	70,998	49,448	2,787	1,928
1973	156,139	2,599	153,540	21,929	74,831	51,386	3,143	2,251
1974	163,974	2,472	161,502	23,418	78,924	53,008	3,610	2,542
1975	170,970	2,495	168,475	24,559	82,621	54,390	4,073	2,832
1976	180,796	2,492	178,304	25,684	88,211	56,730	4,505	3,174
1977	186,767	2,473	184,294	26,652	91,960	57,340	4,726	3,616
1978	201,321[r]	2,543[r]	198,778	28,782	101,466	59,185	5,315	4,028
1979	213,948	3,609	210,339	31,311	106,028	62,362	5,864	4,770
1980	214,853	3,808	211,045	31,664	107,930	60,505	6,001	4,945
1981	217,196[r]	3,970[r]	213,226	33,301	107,983	59,914	6,974	5,049
1982	213,851[r]	4,072[r]	209,779	33,228	106,503	57,670	6,169	6,209
1983	217,496	4,203	213,293	34,404	107,228	59,199	6,540	5,923

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

[a] Before 1971, an active aircraft was one certified as eligible to fly. Currently, an "active aircraft" must have a current U.S. registration and have been flown during the previous calendar year.

[b] Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in commuter passenger service. Excludes single-engine aircraft as of 1978.

[c] Includes autogiros; excludes air carrier helicopters.

[d] Includes gliders, dirigibles and balloons.

ACTIVE U.S. CIVIL AIRCRAFT BY PRIMARY USE AND TYPE OF AIRCRAFT

As of December 31, 1983

Primary Use[a]	TOTAL	Fixed Wing			Rotorcraft[b]	Other[c]
		Turbojet	Turboprop	Piston		
TOTAL—ALL AIRCRAFT	217,496	6,665	6,329	192,031	6,549	5,923
Air Carrier—TOTAL	4,203	2,767	876	551	9	—
Certificated Route Air Carriers	2,618	2,492	118	8	—	—
Supplemental Air Carriers	151	80	48	23	—	—
Commercial Operators	67	33	16	18	—	—
Air Taxis	77	13	36	28	—	—
Commuters	1,143	53	636	445	9	—
All Cargo	137	86	22	29	—	—
Air Travel Clubs	10	10	—	—	—	—
General Aviation—TOTAL	213,293	3,898	5,453	191,480	6,540	5,923
Executive	17,064	3,425	3,308	8,552	1,711	68
Business	45,025	217	775	43,581	383	69
Commuter[d]	1,479	—	286	1,175	18	—
Air Taxi[d]	6,857	45	551	5,114	1,137	11
Instructional	15,450	—	—	14,396	481	572
Rental	7,674	—	37	7,369	8	261
Personal	101,484	75	62	96,545	562	4,240
Aerial Application	7,051	—	116	6,220	715	—
Aerial Observation	4,023	25	4	3,413	463	118
Other Work	2,392	—	38	1,659	519	177
Other	4,791	110	279	3,454	543	406

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Includes helicopters and autogiros.

[c] Includes gliders, dirigibles and balloons.

[d] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories included with "air carriers."

U.S. GENERAL AVIATION
ACTIVE AIRCRAFT AND HOURS FLOWN
BY PRIMARY USE

Calendar Years 1979-1983

Primary Use[a]	1979	1980	1981	1982	1983
ACTIVE AIRCRAFT AS OF DECEMBER 31					
TOTAL	210,339	211,045	213,226	209,779	213,293
Executive	13,638	14,860	18,582	15,739	17,064
Business	49,658	49,391	47,716	47,873	45,025
Commuter	8,399	944	1,023	1,070	1,479
Air Taxi		7,615	7,226	8,122	6,857
Instructional	15,456	14,862	14,993	14,708	15,450
Rental	12,771	11,829	10,585	9,844	7,674
Personal	94,427	96,222	95,510	94,820	101,484
Aerial Application[c]	15,989	15,323	7,976	7,155	7,051
Aerial Observation[c]			3,384	4,164	4,023
Other Work[c]			1,491	1,733	2,392
Other[c]			4,741	4,546	4,791
THOUSANDS OF HOURS FLOWN					
TOTAL	43,340	41,016	40,704	36,457	35,249
Executive	5,001	5,332	6,190	4,983	5,241
Business	8,979	8,434	8,122	6,861	5,956
Commuter[b]	4,573	961	979	1,086	1,602
Air Taxi[b]		3,535	2,809	3,187	2,528
Instructional	6,462	5,748	5,597	4,924	4,865
Rental	4,206	3,917	3,768	2,961	2,389
Personal	9,471	8,894	8,241	8,182	8,477
Aerial Application[c]	4,544	4,105	2,447	2,043	1,762
Aerial Observation[c]			1,402	1,256	1,138
Other Work[c]			369	467	642
Other[c]			769	638	553

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).
NOTE: Detail may not add to totals because of rounding and estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories classified as "air carriers."

[c] Prior to 1981, reported as Aerial Application (differently defined), Industrial, and Other.

U.S. GENERAL AVIATION
TYPE OF AIRCRAFT AND HOURS FLOWN
Calendar Years 1979-1983

	1979	1980	1981	1982	1983
Number of Active Aircraft by Type					
All Aircraft—TOTAL	210,339	211,045	213,226	209,779	213,293
Fixed Wing: Piston:					
Single Engine: 1-3 Seats	62,362	60,505	59,914	57,670	59,199
4+ Seats	106,028	107,930	107,983	106,503	107,228
Multi-Engine: 1-6 Seats	16,891	16,224	16,749	16,381	16,249
7+ Seats	7,958	8,141	8,607	8,501	8,660
Other	229	212	114	140	143
Turboprop:					
Twin Engine: 1-12 Seats	2,944	3,339	3,968	4,427	4,733
13+ Seats	538	627	557	610	578
Other	96	123	134	149	142
Turbojet: Twin Engine	2,309	2,551	2,808	3,309	3,447
Other	343	441	362	687	451
Rotorcraft: Piston	3,123	2,794	3,250	2,419	2,541
Turbine	2,740	3,207	3,724	3,749	3,998
Balloons, Dirigibles, and Gliders	4,770	4,945	5,049	5,233	5,923
Thousands of Hours Flown by Type of Aircraft					
All Aircraft—TOTAL	43,340	41,016	40,704	36,457	35,249
Fixed Wing: Piston	37,303	34,747	34,086	29,950	28,911
Turboprop	1,871	2,240	2,155	2,168	2,173
Turbojet	1,259	1,332	1,387	1,611	1,473
Rotorcraft: Piston	892	736	930	579	572
Turbine	1,664	1,603	1,754	1,771	1,700
Balloons, Dirigibles, and Gliders	353	359	391	379	420
Average Hours Flown per Year per Aircraft by Type					
All Aircraft—TOTAL	206	191	188	174	164
Fixed Wing: Piston:					
Single Engine: 1-3 Seats	180	166	171	146	140
4+ Seats	181	170	163	151	139
Multi-Engine: 1-6 Seats	238	228	215	187	187
7+ Seats	359	311	326	317	318
Other	663	625	197	247	240
Turboprop:					
Twin Engine: 1-12 Seats	426	445	398	356	301
13+ Seats	1,064	1,038	989	853	1,139
Other	466	487	499	394	579
Turbojet: Twin Engine	487	456	443	407	392
Other	392	350	377	385	274
Rotorcraft: Piston	286	263	285	237	221
Turbine	608	498	490	474	432
Balloons, Dirigibles, and Gliders	74	75	78	72	71

Source: General Aviation Manufacturers Association, "General Aviation Statistical Databook," (Annually), based on data from the Federal Aviation Administration.

NOTE: Detail may not add to totals because of rounding and/or estimating procedures.

ACTIVE U.S. AIRMAN CERTIFICATES HELD

As of December 31, 1980-1984

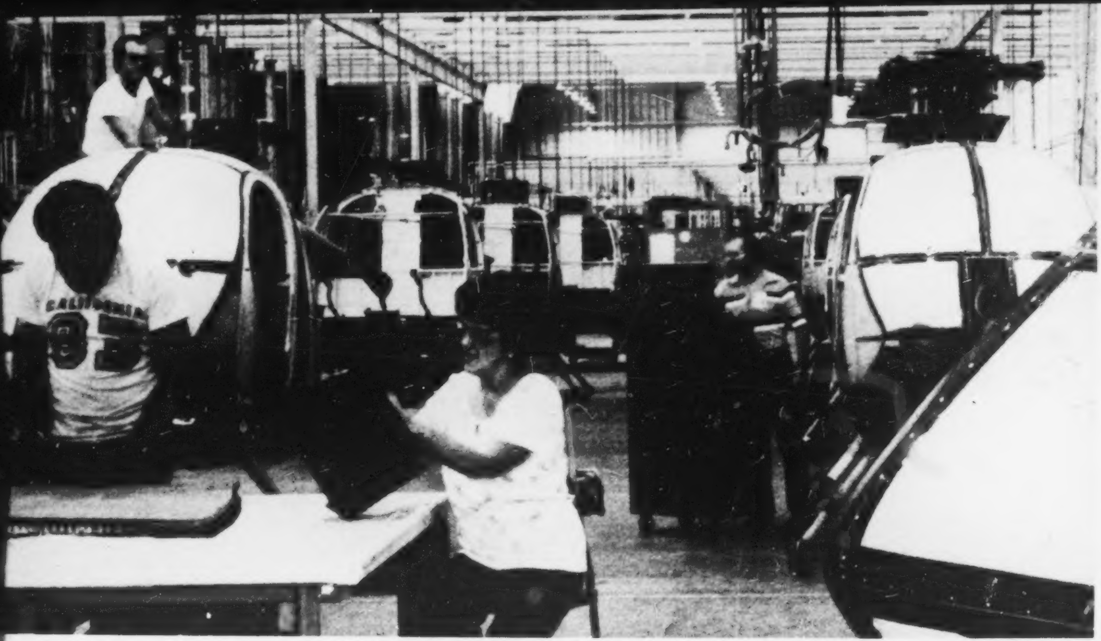
	1980	1981	1982	1983	1984
Pilots—TOTAL	827,071	764,182	733,255	718,004	722,376
Students	199,833	179,912	156,361	147,197	150,081
Private	357,479	328,562	322,094	318,643	320,086
Commercial	183,442	168,580	165,093	159,495	155,929
Airline Transport	69,569	70,311	73,471	75,938	79,192
Helicopter (only)	6,030	6,453	7,034	7,237	7,532
Glider (only)[a]	7,039	7,388	7,842	8,157	8,390
Other Pilot[a]	3,679	2,976	1,360	1,337	1,166
Non-Pilots—TOTAL	393,486	398,368	420,595	432,890	447,462
Mechanics[b]	250,157	262,705	277,436	288,335	298,028
Parachute Rigger[b]	9,547	9,716	9,893	10,074	10,194
Ground Instructor[b]	61,550	63,246	65,004	66,385	67,463
Dispatcher[b]	6,799	7,094	7,580	8,223	8,980
Control Tower Operator	25,130	15,528	20,934	19,691	20,660
Flight Navigator	1,936	1,785	1,695	1,636	1,603
Flight Engineer	38,367	38,294	38,053	38,546	40,534
Flight Instructor Certificates[c]	60,440	57,523	62,492	62,201	61,173
Instrument Ratings[c]	260,461	252,535	255,073	254,271	256,584

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

[a] Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above are the pilots who received a medical.

[b] No periodic medical examination required; therefore, no determination as to current activity can be made.

[c] Special ratings shown on pilot certificates represented above, not additional certificates.



HELICOPTER TRANSPORTATION

In 1984, there were 99 models of civil VTOL (Vertical TakeOff and Landing) aircraft (helicopters) in operational service worldwide and 45 types in production, according to the *Directory of VTOL Aircraft* published by Aerospace Industries Association. The directory also listed 99 types of operational military VTOLs and 21 in production, again virtually all helicopters, although there are some military VTOLs that are not rotary-wing aircraft.

In the U.S., there were 17 types of civil helicopters in production during 1984. They included the five-place Bell Helicopter Textron 206B JetRanger III; two models of Bell's seven-place 206L LongRanger; the 15-place Bell 212; the 20-place Bell 214ST; two models of the 8/10-place twin-turbine Bell 222; the 44-passenger Boeing Vertol Model 234; the three-place Enstrom F-28 and 280F; two models of the 3/4-place Hiller UH-12; the 5/7-place Hughes 500E and 530F; the two-place Robinson R22 Alpha; the Schweizer-built Hughes 300; and the 14-place Sikorsky S-76 twin-turbine transport. During the year, the rotary wing segment of the aerospace industry produced 376 civil helicopters, down from 403 in the previous year and the lowest number in more than two decades. Dollar value, however, increased—to $330 million in 1984 from $303 million in 1983.

The *AIA Directory of Heliports/Helistops in the U.S., Canada and Puerto Rico* listed 4,232 helicopter facilities in 1984, which compares with 3,985 in 1981, the last prior year that AIA surveyed rotary-wing facilities. In addition to the land facilities, there were 261 facilities at offshore oil rigs and platforms.

The increase in the number of heliports/helistops reflects not only greater activity in traditional helicopter employment—by hospitals, police/fire departments and oil producers, for example—but also continually expanding provision of helicopter facilities in such non-traditional locales as hotels, motels, garages, shopping centers, department stores, convention centers, colleges/universities and industrial plants.

There was notable growth in hospital helicopter facilities, the largest single category. In 1984, there were 1,071 hospital heliports, compared with 905 in 1981—an increase of more than 18 percent between surveys. Seventy-eight hospitals were providing helicopter ambulance services, compared with 46 in 1981. In addition, other agencies—such as police or transportation departments—were providing emergency ambulance service in 30 states.

Of the 4,232 land heliports and helistops, 413 were in New Jersey, top ranked among the states. In second place was Texas with 370 facilities, followed by California (365), Pennsylvania (262), Illinois (250) and Ohio (230). Other states with more than 100 facilities were Florida, Louisiana, New York and Washington. Canada had 147 heliports/helistops and Puerto Rico 65.

In May 1985, the Indianapolis (Indiana) Airport Authority dedicated its Downtown Heliport, the first operational facility in the Federal Aviation Administration's National Prototype Demonstration Heliport Program, intended to evaluate modern heliport design and equipment for Instrument Flight Rules operation. The program includes heliports being developed in New York, New Orleans and Los Angeles.

During 1984, there were four scheduled commercial helicopter services operating in the U.S. Two of them were providing service linking downtown New York City and the New York airports; another was providing similar airport-city service in Houston, Texas; and a third was flying passengers between New York/New Jersey locales and the Altantic City (New Jersey) resort area.

Among 1984/85 rotary wing research projects with applicability to civil helicopters:

- Bell Helicopter Textron and Dornier GmbH (Germany) signed an agreement for joint development of an advanced bearingless-hingeless rotor, comprised of only six basic parts, that offers mechanical simplicity and exceptionally low vibration among a number of other advantages. The new project is a continuation of a cooperative relationship between the two companies that has existed for more than a decade.

- Sikorsky Aircraft's single-pilot research helicopter made its first flight in June 1985. The aircraft is a Sikorsky S-76 with a single-seat evaluation cockpit joined to the nose. After shakedown tests, the helicopter was to be fitted with a variety of advanced avionic/electronic systems linked by a digital data bus; initial tests of the fully-equipped helicopter were planned for late 1985. The research vehicle is a multi-company project involving Sikorsky and eight industrial partners.

HELIPORTS AND HELISTOPS[a] IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1973-1984

Region	1973	1975	1977	1981	1984
TOTAL	2,384	3,268	3,433	3,985	4,232
Elevated Facilities	241	277	299	319	385
New England	78	143	164	168	172
Middle Atlantic	581	684	795	727	793
East North Central	307	411	397	718	640
West North Central	110	98	107	164	215
South Atlantic	204	352	306	416	511
East South Central	64	107	144	203	192
West South Central	217	338	339	409	551
Mountain	176	241	213	268	312
Pacific	551	789	821	734	634
Puerto Rico	24	30	73	71	65
Canada	72	75	74	107	147

Source: Aerospace Industries Association, "Directory of Heliports/Helistops in the U.S., Canada, Puerto Rico, 1984."

[a] Includes Hospital Heliports reported below; excludes offshore oil platforms and rigs, which numbered 261 as of May 1984.

HOSPITAL HELIPORTS[a] IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1973-1984

Region	1973	1975	1977	1981	1984
TOTAL	384	565	699	905	1,071
New England	5	16	21	31	30
Middle Atlantic	42	55	73	93	107
East North Central	99	126	150	193	193
West North Central	21	22	29	69	97
South Atlantic	50	76	82	135	176
East South Central	18	29	54	171	76
West South Central	26	59	67	77	110
Mountain	32	56	67	88	98
Pacific	87	119	147	135	167
Puerto Rico	—	—	2	2	3
Canada	4	7	7	11	14

Source: Aerospace Industries Association, "Directory of Heliports/Helistops in the U.S., Canada, Puerto Rico, 1984."

[a] Included in Heliports/Helistops data reported in previous table.

HELIPORTS/HELISTOPS[a] AND HOSPITAL HELIPORTS IN THE UNITED STATES, CANADA AND PUERTO RICO

By State
As of 1984

State & Country	Heliports and Helistops	
	Total	Hospital Heliports
TOTAL	4,232	1,071
U.S.—TOTAL	4,020	1,054
Alabama	75	24
Alaska	49	7
Arizona	94	25
Arkansas	10	6
California	365	92
Colorado	109	38
Connecticut	55	1
Delaware	22	3
Dist. of Col.	22	5
Florida	166	53
Georgia	61	21
Hawaii	18	6
Idaho	23	7
Illinois	250	90
Indiana	74	22
Iowa	48	28
Kansas	25	11
Kentucky	28	12
Louisiana	145	26
Maine	12	2
Maryland	64	27
Massachusetts	66	19
Michigan	51	19
Minnesota	19	3
Mississippi	31	18
Missouri	80	37
Montana	15	8
Nebraska	30	13
Nevada	21	4
New Hampshire	20	5
New Jersey	413	27
New Mexico	13	5
New York	118	29
North Carolina	43	21
North Dakota	7	4
Ohio	230	57
Oklahoma	26	15
Oregon	90	33
Pennsylvania	262	51
Rhode Island	5	1
South Carolina	15	5
South Dakota	6	1
Tennessee	58	22
Texas	370	63
Utah	22	7
Vermont	14	2
Virginia	78	30
Washington	112	29
West Virginia	40	11
Wisconsin	35	5
Wyoming	15	4
Puerto Rico	65	3
Canada	147	14

Source: Aerospace Industries Association, "Directory of Heliports/Helistops in the U.S., Canada, and Puerto Rico, 1984."

[a] Excludes offshore oil platforms and rigs, which numbered 261 as of May 1984.

CIVIL HELICOPTER OPERATORS AND HELICOPTERS OPERATED IN THE UNITED STATES, CANADA, MEXICO AND PUERTO RICO[a]

Selected Years 1965-1982[e]

Year	TOTAL	Commercial	Corporate and Executive	Civil Government Agencies[b]
CIVIL HELICOPTER OPERATORS				
1965	860	508	299	53
1966	933	519	353	61
1967	1,023	522	427	74
1969	1,379	689	596	94
1971	1,424	672	590	162
1972	1,491	758	566	167
1973	1,532	752	599	181
1974	1,536	725	608	203
1975	1,891	779	833	279
1976	2,330	911	1,082	337
1977	2,547	959	1,219	369
1978	3,003	1,126	1,515	362
1980[d]	2,573	1,065	1,160	348
1982[e]	2,688	1,188	1,158	342
HELICOPTERS OPERATED[c]				
1965	2,053	1,537	401	115
1966	2,318	1,699	475	144
1967	2,438	1,764	487	187
1969	3,433	2,390	770	273
1971	3,874	2,605	802	467
1972	4,185	2,992	745	448
1973	4,601	3,295	780	526
1974	4,819	3,418	778	582
1975	5,222	3,342	1,056	824
1976	6,181	3,702	1,392	1,087
1977	7,160	4,294	1,578	1,288
1978	8,023	4,904	1,891	1,228
1980[d]	8,575	5,581	1,635	1,360
1982[e]	8,884	5,874	1,728	1,282

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83."

[a] Effective 1982, includes Mexico.

[b] Federal, state and local governments.

[c] Includes some helicopters on order.

[d] Because computerization of Directory data resulted in the elimination of some duplication of operator and helicopter listings, 1980 and subsequent data are not comparable with those of previous years.

[e] Latest available data.

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO
1982[a]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
Alabama	44	13	20	11	333	24	29	280
Alaska	41	27	8	6	329	311	10	8
Arizona	71	39	25	7	211	143	42	26
Arkansas	16	8	5	3	32	19	8	5
California	330	159	122	49	904	495	199	210
Colorado	73	30	34	9	208	130	54	24
Connecticut	15	2	13	—	26	6	20	—
Delaware	7	2	4	1	8	2	4	2
Dist. of Col.	7	1	—	6	23	1	—	22
Florida	168	72	59	37	538	355	89	94
Georgia	32	14	9	9	71	31	9	31
Hawaii	21	17	3	1	48	40	6	2
Idaho	40	18	16	6	91	59	20	12
Illinois	52	24	18	10	148	77	48	23
Indiana	46	20	16	10	86	43	21	22
Iowa	24	11	8	5	37	15	9	13
Kansas	19	9	7	3	38	19	11	8
Kentucky	47	10	35	2	74	26	43	5
Louisiana	58	28	20	10	840	763	55	22
Maine	9	4	4	1	20	10	6	4
Maryland	16	7	6	3	55	33	6	16
Massachusetts	24	12	10	2	55	24	28	3
Michigan	56	22	23	11	97	43	29	25
Minnesota	33	17	15	1	55	34	17	4
Mississippi	14	5	3	6	28	11	3	14
Missouri	27	13	8	6	80	51	13	16
Montana	25	16	4	5	58	44	4	10
Nebraska	19	6	11	2	34	16	16	2
Nevada	27	12	10	5	62	35	18	9
New Hampshire	9	5	4	—	20	12	8	—
New Jersey	66	23	37	6	131	70	46	15
New Mexico	21	7	12	2	35	15	15	5

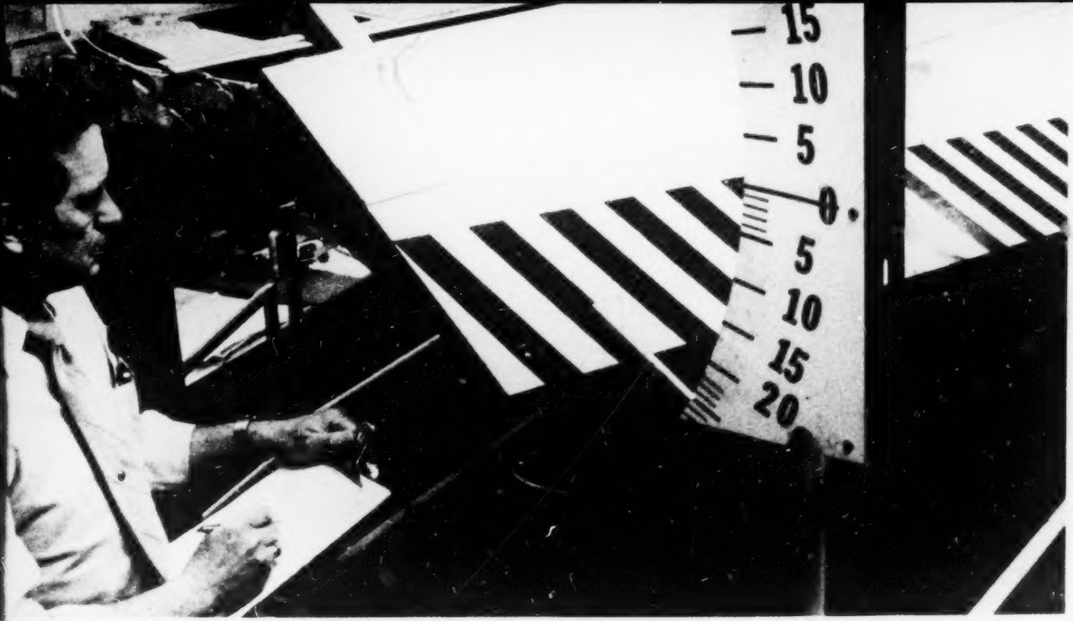
(Continued on next page)

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO (Continued)
1982[a]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
New York	96	31	54	11	264	148	83	33
North Carolina	21	6	12	3	47	21	14	12
North Dakota	17	14	3	—	32	29	3	—
Ohio	78	28	43	7	138	75	44	19
Oklahoma	39	18	19	2	141	94	32	15
Oregon	90	50	36	4	386	323	46	17
Pennsylvania	107	37	69	1	208	110	88	10
Rhode Island	6	4	1	1	14	11	2	1
South Carolina	22	5	12	5	49	30	13	6
South Dakota	8	3	2	3	12	4	5	3
Tennessee	51	17	25	9	111	50	27	34
Texas	207	88	104	15	638	381	207	50
Utah	24	17	6	1	151	141	9	1
Vermont	3	—	3	—	3	—	3	—
Virginia	35	12	16	7	58	24	18	16
Washington	85	46	32	7	182	127	38	17
West Virginia	48	10	34	4	63	16	39	8
Wisconsin	16	6	7	3	58	46	7	5
Wyoming	22	14	8	—	47	39	8	—
Puerto Rico	9	1	3	5	11	1	3	7
U.S. Total	2,441	1,060	1,058	323	7,388	4,627	1,575	1,186
Canada	244	125	100	19	1,464	1,215	153	96
Mexico	3	3	—	—	32	32	—	—
TOTAL	2,688	1,188	1,158	342	8,884	5,874	1,728	1,282

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States,Canada, Mexico and Puerto Rico, 1982/83".

[a] Latest available data.



RESEARCH AND DEVELOPMENT

Industrial spending for aerospace research and development, including both government and company funding, increased substantially in 1984 and will again in 1985, according to a study by McGraw-Hill Economics, a division of McGraw-Hill Publications Company. The company's annual survey of business R&D expenditures estimates that aerospace outlays totaled $16.7 billion in 1984, some 21 percent more than the $13.7 billion spent in the previous year. The average increase for the year among U.S. businesses as a whole was estimated as 12.3 percent by McGraw-Hill, and 10.9 percent by the National Science Foundation.

For 1985, McGraw-Hill estimates aerospace R&D spending at $18.3 billion, an increase of 9.4 percent. Expenditures will continue to mount during 1985-88, but at a slower pace. Aerospace spending is expected to reach $21.7 billion by 1988.

Total R&D spending by all U.S. businesses in 1984 is estimated by McGraw-Hill at $70.6 billion, and the study indicates that figure will climb to $78.3 billion in 1985. In both years, aerospace R&D outlays amount to about 23 percent of all U.S. business spending for R&D. In terms of R&D dollar value, aerospace ranked Number One in 1984, followed by the electrical machinery industry ($14.7 billion) and non-electrical machinery ($9.2 billion). The same industries will place 1-2-3 in 1985, McGraw-Hill predicts. Measuring R&D outlays as a percentage of sales, the aerospace industry tops the lists by a wide margin with percentages of 21.7 in 1984 and 19.6 in 1985.

McGraw-Hill's projection for the 1985-88 period indicates that industrial R&D growth will be on the order of 6.6 percent annually (all-industry average); this compares with a 12.2 percent growth rate for the first half of the 1980s. The survey forecasts that aerospace will continue to lead all U.S. businesses in R&D dollar value through 1988, but that the aerospace percentage gain over that span—18.8 percent—will be well below the 21.3 percent all-business average.

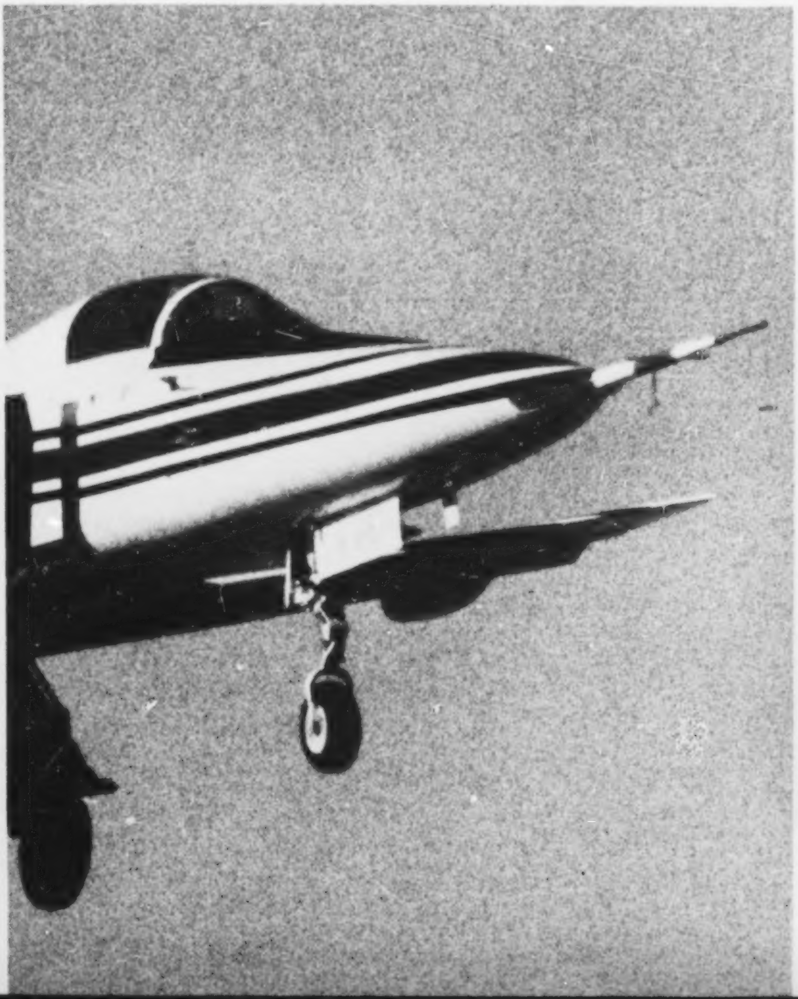
Data supplied by the National Science Foundation shows total U.S. R&D expenditures in 1985 at $107 billion; this figure includes not only business expenditures, but work performed by other organizations among government agencies, colleges and universities, non-profit institutions and federally-funded research centers. The figure compares with $95.9 billion in 1984. Businesses will provide funding for roughly half of the total, while the federal government will fund $49.8 billion, or more than 46 percent.

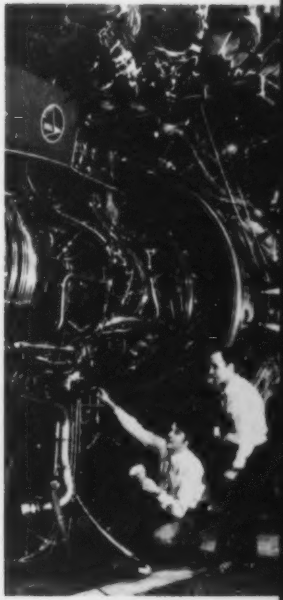
On the basis of the Administration's FY 1986 budget proposal, on which final action was pending at press time, federal outlays for R&D would increase significantly—to $53 billion from $46.3 billion in FY 1985, a gain of over 14 percent. The bulk of the increase is in outlays of the Department of Defense, which have been climbing steadily throughout the 1980s. DoD outlays for FY 1986, if Congress accepted the Administration request as is, would increase by $6.3 billion to $34.9 billion, about 22 percent. NASA outlays would increase by $300 million (nine percent).

A Department of Defense analysis of outlays for research, development, test and evaluation (RDT&E) shows that the Air Force is conducting by far the greatest RDT&E program among DoD agencies. Air Force outlays for FY 1985 amount to $12.2 billion, compared with $8.3 billion for the Navy, $4.1 billion for the Army and $3.2 billion for other DoD agencies. The Air Force continues to head the list in a projection for FY 1986, which estimates Air Force outlays at $14.1 billion, the Navy's at $10 billion, other agencies' at $5.2 billion and the Army's at $4.7 billion.

NASA funding for R&D activities declined from $3.5 billion in FY 1983 to $3.3 billion in FY 1984. A budget projection for FY 1985 shows a rebound in NASA R&D to $3.6 billion. Under long range plans, NASA R&D outlays would climb significantly in the latter years of this decade if Congress continues to support the space station program.

Federal outlays for aeronautics research and development increased substantially in FY 1985, as they had in the previous year. Total FY 1985 estimated outlays for DoD, NASA and the Federal Aviation Administration (Department of Transportation) amounted to $5.1 billion, up from $4.5 billion in FY 1984. Almost all of the increase was in DoD funding, which increased some $550 million. NASA R&D outlays totaled $693 million (up $52 million) and the FAA's came to $252 million (up $60 million).





FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

By Funding Source
Calendar Years 1972-1985
(Millions of Dollars)

Year	All Industries[a]			Aerospace Industry[b]		
	Total	Federal Funds	Company Funds[c]	Total	Federal Funds	Company Funds[c]
CURRENT DOLLARS						
1972	$19,552	$ 8,017	$11,535	$ 4,950	$ 3,970	$ 978
1973	21,249	8,145	13,104	5,052	3,899	1,154
1974	22,887	8,220	14,667	5,278	4,000	1,278
1975	24,187	8,605	15,582	5,713	4,428	1,285
1976	26,997	9,561	17,436	6,339	4,921	1,418
1977	29,825	10,485	19,340	7,033	5,486	1,547
1978	33,304	11,189	22,115	7,536	5,713	1,823
1979	38,226	12,518	25,708	8,041	5,840	2,201
1980	44,505	14,029	30,476	9,198	6,628	2,570
1981[r]	51,810[r]	16,382[r]	35,428[r]	11,968	8,528	3,440
1982[r]	57,995[r]	18,483[r]	39,512[r]	13,658[r]	9,776[r]	3,882[r]
1983	62,816	20,215[r]	42,601	13,741	10,300[r]	3,441[r]
1984[E]	69,250	22,000	47,250	16,685	12,507	4,178
1985[E]	77,500	25,100	52,400	18,255	13,684	4,571
CONSTANT DOLLARS (1972 = 100)[d]						
1972	$19,552	$ 8,017	$11,535	$ 4,950	$ 3,970	$ 978
1973	20,094	7,702	12,391	4,777	3,687	1,091
1974	19,888	7,143	12,745	4,586	3,476	1,111
1975	19,228	6,841	12,387	4,542	3,520	1,022
1976	20,400	7,225	13,175	4,790	3,718	1,071
1977	21,296	7,487	13,809	5,022	3,917	1,105
1978	22,141	7,439	14,702	5,010	3,798	1,212
1979	23,391	7,660	15,731	4,920	3,574	1,347
1980	24,944	7,863	17,081	5,155	3,715	1,440
1981[r]	26,488	8,375	18,112	6,119	4,360	1,759
1982[r]	27,966	8,913	19,053	6,586	4,714	1,872
1983[r]	29,171	9,387	19,783	6,381	4,783	1,598
1984[E]	30,994	9,846	21,148	7,468	5,598	1,870
1985[E]	33,420	10,824	22,596	7,872	5,901	1,971

Source: National Science Foundation, for historical data and All Industries estimates; McGraw-Hill Publications Company for Aerospace Industry Total estimates; AIA for Aerospace Industry Federal/Company estimates. The McGraw-Hill estimates for All Industries are $70,572 million for 1984 and $78,270 million for 1985.

NOTE: Detail may not add to totals because of rounding.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[c] Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

[d] Based on GNP implicit price deflator.

[E] Estimate.

[r] Revised.

TOTAL U.S. FUNDS FOR RESEARCH AND DEVELOPMENT BY SOURCE AND PERFORMER[a]

Calendar Years 1983-1985
(Millions of Current Dollars)

Source of Funds	Total All Performers	Performer				
		Federal Government	Industry	Colleges & Universities	Federally-Funded Research & Development Centers	Nonprofit Institutions
1983[p]						
All Sources—TOTAL	$ 86,555	$10,582	$62,816	$7,745	$2,737	$2,675
Federal Government	40,344	10,582	20,215	4,960	2,737	1,850
Industry	43,246	—	42,601	370	—	275
Colleges & Universities	1,830	—	—	1,830	—	—
Nonprofit Institutions	1,135	—	—	585	—	550
1984[E]						
All Sources—TOTAL	$ 95,925	$12,300	$69,250	$8,625	$2,775	$2,975
Federal Government	44,675	12,300	22,000	5,500	2,775	2,100
Industry	47,975	—	47,250	425	—	300
Colleges & Universities	2,080	—	—	2,080	—	—
Nonprofit Institutions	1,195	—	—	620	—	575
1985[E]						
All Sources—TOTAL	$106,600	$13,300	$77,500	$9,625	$2,975	$3,200
Federal Government	49,775	13,300	25,100	6,150	2,975	2,250
Industry	53,210	—	52,400	485	—	325
Colleges & Universities	2,300	—	—	2,300	—	—
Nonprofit Institutions	1,315	—	—	690	—	625

Source: National Science Foundation.

[a] Source/performer detail not available by industry.

[p] Preliminary.

[E] Estimate.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT[a] BY INDUSTRY

Calendar Years 1983-1985
(Millions of Dollars)

Industry	Current Dollars[a]			Constant Dollars[b]		
	1983[p]	1984[E]	1985[E]	1983[p]	1984[E]	1985[E]
ALL BUSINESS	$62,816	$70,572	$78,270	$29,171	$31,586	$33,752
ALL MANUFACTURING	60,751	68,609	76,210	28,212	30,707	32,863
Aerospace	$13,741	$16,685	$18,255	$ 6,381	$ 7,468	$ 7,872
Electrical Machinery	13,651	14,677	15,954	6,339	6,569	6,880
Non-Electrical Machinery	8,382	9,232	10,303	3,892	4,132	4,443
Chemicals	7,287	7,337	8,066	3,384	3,284	3,478
Autos, Trucks & Parts	5,372	6,469	7,845	2,495	2,895	3,383
Instruments	4,387	6,001	6,708	2,037	2,686	2,893
Petroleum	2,199	2,197	2,345	1,021	983	1,011
Rubber & Plastic	942	1,018	1,102	437	456	475
Food & Beverage	880	935	1,028	409	418	443
Paper & Pulp	730	665	722	339	298	311
Iron & Steel	658	619	774	306	277	334
Fabricated Metals	634	545	576	294	244	248
Stone, Clay & Glass	628	705	775	292	316	334
Nonferrous Metals	438	623	801	203	279	345
Textiles	188	170	176	87	76	76
Other Manufacturing	634	731	780	294	327	336

Source: McGraw-Hill Publications Company.

[a] McGraw-Hill data, based on 1983 preliminary figures from the National Science Foundation plus estimates from the McGraw-Hill annual spring survey of plans for business R&D spending.

[b] Based on GNP implicit price deflator, 1972 = 100. Detail may not add to totals because of rounding.

[p] Preliminary.

[E] Estimate.

FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT IN THE AEROSPACE INDUSTRY

By Type of Research and Funding Source
Calendar Years 1962-1983[a]
(Millions of Dollars)

Year	TOTAL AERO-SPACE	Basic Research			Applied Research			Development		
		Total	Federal Funds	Com-pany Funds	Total	Federal Funds	Com-pany Funds	Total	Federal Funds	Com-pany Funds
1962	$ 4,042	$ 54	$28	$26	$ 789	$664	$125	$ 3,198	$2,897	$ 301
1963	4,712	59	31	28	735	585	150	3,917	3,634	283
1964	5,078	67	34	34	766	607	159	4,244	3,948	296
1965	5,148	71	41	30	735	563	172	4,342	3,921	421
1966	5,526	69	36	33	773	563	210	4,685	4,162	523
1967	5,669	71	33	38	726	490	236	4,871	4,071	800
1968	5,765	68	26	42	677	426	251	5,021	4,145	876
1969	5,882	65	24	41	597	347	250	5,220	4,216	1,004
1970	5,219	63	20	43	565	352	213	4,591	3,718	873
1971	4,881	54	37	17	461	279	182	4,365	3,583	782
1972	4,950	60	44	16	451	267	184	4,438	3,722	716
1973	5,052	50	21	29	512	308	204	4,491	3,633	858
1974	5,278	51	19	32	609	360	249	4,617	3,735	882
1975	5,713	54	17	37	614	381	233	5,044	4,119	925
1976	6,339	54	21	33	666	365	301	5,619	4,521	1,098
1977[a]	7,033	56	25	31	753	419	334	6,223	5,017	1,206
1979	8,041	86	44	42	880	499	381	7,076	5,314	1,762
1981	11,968	131	60	71	1,484	897	587	10,353	7,738	2,615
1983	13,741	136	NA	NA	3,427	NA	NA	10,178	7,621	2,557

Source: National Science Foundation, plus estimates by AIA to adjust originally-published breakouts by Research Type and Funding Source to NSF's revised totals.

NOTE: Detail may not add to totals because of rounding.

[a] Break-outs by Research Type and Funding Source available only for odd-numbered years after 1977.

RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1970-1983

Year	All Manufacturing Industries[a]		Aerospace Industry[b]	
	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales
1970	3.7%	2.2%	16.2%	3.8%
1971	3.5	2.1	16.2	3.4
1972	3.4	2.0	16.6	3.3
1973	3.3	2.0	13.3	3.0
1974	3.1	2.0	14.1	3.5
1975	3.1	2.0	12.7	2.8
1976	3.1	2.0	12.7	2.8
1977	2.9	2.0	13.3	2.9
1978	2.9	2.0	13.3	3.2
1979	2.6	1.9	12.9	3.5
1980	3.0	2.1	13.7	3.8
1981	3.1	2.2	16.0	4.6
1982[r]	3.8	2.6	17.7	5.0
1983	3.8	2.6	15.8	3.9

Source: National Science Foundation.

[a] Includes all manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

FUNDS FOR ENERGY RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1980-1984
(Millions of Dollars)

	1980	1981	1982[r]	1983	1984[E]
All Industries[a]—TOTAL	$4,162	$4,216	$4,287	$4,344	$4,465
Federal Funds	1,563	1,536	1,489	1,485	NA
Company Funds	2,599	2,680	2,798	2,859	NA
Aerospace Industry[b]—**TOTAL**	$ 446	$ 412	$ 346	$ 376	$ 353
Federal Funds	283	288	258	NA	NA
Company Funds	163	124	88	NA	NA

Source: National Science Foundation.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

NA Not available.

[E] Estimated by surveyed companies.

[r] Revised.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Fiscal Years 1969-1985
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD[b]	DOT[c]
BUDGET AUTHORITY				
1969	$1,300	$169	$1,161	$(30)[d]
1970	1,882	199	1,641	42
1971	1,990	210	1,707	73
1972	2,295	236	1,964	95
1973	2,187	313	1,799	75
1974	2,030	278	1,678	74
1975	2,015	314	1,627	74
1976	2,351	325	1,941	85
Tr. Qtr.	584	83	480	22
1977	2,727	378	2,256	93
1978	3,338	437	2,807	94
1979	2,850	519	2,240	91
1980	2,991	560	2,336	95
1981	3,286	526	2,653	106
1982	3,581	516	2,984	81
1983	3,871	547	3,221	103
1984[E]	4,698	627	3,807	264
1985[E]	5,422	687	4,466	269
OUTLAYS				
1982[f]	$3,309	$563	$2,657	$89
1983	3,554	563	2,920	71
1984[E]	4,476	641	3,642	192
1985[E]	5,138	693	4,192	252

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Latest available data, based on proposed FY 1985 Federal budget.
[a] Research and Development, Construction of Facilities, Research and Program Management.
[b] Research, Development, Testing and Evaluation of aircraft and related equipment.
[c] Federal Aviation Administration Research, Engineering and Development, and Facilities, Engineering and Development.
[d] Unobligated balances for SST research and development, rescinded in 1969.
[E] Estimate. Latest year reflects Administration's budget proposal.
[f] First year outlays data available.

FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1971-1986
(Millions of Dollars)

Year	TOTAL	DOD	NASA	Energy[a]	Other
CURRENT DOLLARS					
1971	$15,050	$ 7,541	$3,382	$1,303	$2,824
1972	16,629	8,275	3,422	1,552	3,380
1973	17,407	8,574	3,315	1,623	3,895
1974	18,239	8,956	3,256	1,825	4,202
1975	19,525	9,341	3,266	2,277	4,641
1976	20,233	9,329	3,521	2,225	5,158
1977	22,462	10,176	3,763	3,181	5,342
1978	24,532	10,726	3,833	3,925	6,048
1979	26,578	11,454	4,064	4,413	6,648
1980	30,351	13,451	4,711	4,698	7,492
1981	34,252	15,720	5,279	5,121	8,132
1982	34,509	18,201	3,220	4,974	8,114
1983	36,560	21,057	2,538	4,771	8,193
1984[r]	40,518	23,583	3,539	4,702	8,694
1985[E]	46,331	28,539	3,260	4,826	9,708
1986[E]	52,958	34,860	3,564	4,714	9,822
CONSTANT DOLLARS (1972 = 100)[b]					
1971	$15,739	$ 7,886	$3,537	$1,363	$2,953
1972	16,629	8,275	3,422	1,552	3,380
1973	16,665	8,209	3,174	1,554	3,729
1974	16,276	7,992	2,906	1,629	3,750
1975	15,839	7,578	2,649	1,847	3,765
1976	15,341	7,073	2,670	1,687	3,911
1977	15,957	7,229	2,673	2,260	3,795
1978	16,319	7,135	2,550	2,611	4,023
1979	16,260	7,007	2,486	2,700	4,067
1980	17,087	7,572	2,652	2,645	4,218
1981[r]	17,534	8,047	2,702	2,621	4,163
1982[r]	16,484	8,694	1,538	2,376	3,876
1983[r]	16,802	9,677	1,166	2,193	3,765
1984[r]	17,938	10,440	1,567	2,082	3,849
1985[E]	19,796	12,194	1,393	2,062	4,148
1986[E]	21,684	14,273	1,459	1,930	4,022

Source: "The Budget of the United States Government, Special Analyses, (Annually).

NOTE: Detail may not add to totals because of rounding.

[a] Energy research and development programs transferred from AEC to ERDA with 1974 reorganization and to Dept. of Energy in 1977.

[b] Based on Fiscal Year GNP implicit price deflator.

[E] Estimate. Latest year reflects Administration's budget proposal.

[r] Revised.

DEPARTMENT OF DEFENSE APPROPRIATIONS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1984-1986
(Millions of Dollars)

	1984	1985^{E}	1986^{E}
TOTAL—APPROPRIATIONS FOR RDT&E	$26,938	$31,452	$39,280
BY APPROPRIATION			
Army	$ 4,215	$ 4,376	$ 5,280
Navy	7,629	9,274	11,264
Air Force	12,275	13,506	15,579
Defense Agencies	2,769	4,236	7,054
Director of Test & Evaluation, Defense	49	59	104
BY RESEARCH CATEGORIES			
Research	$ 843	$ 861	$ 971
Exploratory Development	2,212	2,261	2,555
Advanced Development	5,936	6,837	11,683
Engineering Development	9,165	10,917	10,747
Management and Support	2,406	2,436	2,744
Operational Systems Development	6,375	8,140	10,580
RECAP OF BUDGET ACTIVITIES			
Technology Base	$ 3,055	$ 3,121	$ 3,525
Advanced Technology Development	1,352	2,766	5,461
Strategic Programs	7,878	8,359	8,556
Tactical Programs	7,929	9,498	12,395
Intelligence and Communications	3,406	3,957	5,031
Defensewide Mission Support	3,318	3,751	4,312
RECAP OF FYDP PROGRAMS			
Strategic Forces	$ 726	$ 804	$ 1,205
General Purpose Forces	1,473	2,053	2,631
Intelligence and Communications	4,083	5,022	6,345
Airlift/Sealift	21	32	70
Research and Development (FYDP Program 6)	20,563	23,311	28,700
Central Supply and Maintenance	64	216	318
Training, Medical and Other	3	5	5
Administration & Assoc. Activities	—	5	1
Support of Other Nations	6	4	5

Source: Department of Defense Budget, "R,D,T&E Programs (R-1)" (Annually).
NOTE Detail may not add to totals because of rounding.
E Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE
OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1970-1986
(Millions of Dollars)

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1970	$ 7,166	$ 2,937	$2,084	$1,665	$ 480
1971	7,303	2,809	2,405	1,569	520
1972	7,881	3,205	2,427	1,779	470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr. Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,382	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982	17,729	7,794	5,240	3,230	1,465
1983	20,554	9,182	5,854	3,658	1,861
1984	23,117	10,353	6,662	3,812	2,289
1985[E]	27,786	12,215	8,251	4,095	3,225
1986[E]	33,988	14,076	10,002	4,729	5,181

Source: Department of Defense Budget (Annually).

[E] Estimate. Latest year reflects Administration's budget proposal.

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS[a] FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1980-1984
(Millions of Dollars)

Program Categories	1980	1981	1982	1983	1984
TOTAL—RDT&E	$9,470	$10,483	$14,882	$16,301	$18,277
Research	648	694	685	763	957
Exploratory Development	868	1,081	1,285	1,261	1,246
Other Development	6,920	8,233	12,537	13,915	15,616
Management & Support	1,034	474	375	362	459
Aircraft—TOTAL	$1,171	$ 739	$ 2,906	$ 2,072	$ 2,316
Research	3	4	14	36	95
Exploratory Development	39	58	139	152	142
Other Development	1,126	672	2,740	1,879	2,074
Management & Support	3	6	13	6	4
Missile and Space Systems—TOTAL	3,363	4,603	5,648	6,444	7,296
Research	36	27	14	34	14
Exploratory Development	173	277	322	239	224
Other Development	2,800	4,184	5,265	6,097	6,937
Management & Support	354	115	48	73	120
Electronics & Communications Equipment—TOTAL	2,417	2,582	3,534	4,681	4,644
Research	67	74	77	76	95
Exploratory Development	260	305	351	404	397
Other Development	1,977	2,110	3,049	4,127	4,042
Management & Support	113	93	57	75	111
All Other—TOTAL[b]	2,519	2,558	2,794	3,104	4,021
Research	542	589	581	617	753
Exploratory Development	396	441	473	466	483
Other Development	1,017	1,268	1,482	1,812	2,561
Management & Support	564	260	257	208	224

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).

NOTE: Detail may not add to totals because of rounding.

[a] Effective FY 1980, data include DOD contract awards for civil functions; data for prior years limited to military prime contract awards.

[b] "All Other" includes ships, tank-automative, weapons, ammunition, services, and other.

DEPARTMENT OF DEFENSE
NET VALUE OF PRIME CONTRACT AWARDS OVER $25,000[a] FOR RESEARCH, DEVELOPMENT, TEST & EVALUATION

By Region and Type of Contractor
Fiscal Year 1984

REGION	TOTAL	Type of Contractor		
		Educational Institutions	Other Non-Profit Institutions[a]	Business Firms
TOTAL—Millions of Dollars	$18,125	$1,069	$1,048	$16,009
New England	$ 2,396	$ 309	$ 507	$ 1,580
Middle Atlantic	2,174	80	35	2,059
East North Central	767	61	69	637
West North Central	997	10	2	985
South Atlantic	1,942	350	68	1,525
East South Central	270	7	5	259
West South Central	847	46	11	790
Mountain	1,050	65	1	985
Pacific[b]	7,681	141	351	7,189
PERCENT OF TOTAL	100.0%	100.0%	100.0%	100.0%
New England	13.2%	28.9%	48.4%	9.9%
Middle Atlantic	12.0	7.5	3.3	12.9
East North Central	4.2	5.7	6.6	4.0
West North Central	5.5	0.9	0.2	6.2
South Atlantic	10.7	32.7	6.5	9.5
East South Central	1.5	0.6	0.4	1.6
West South Central	4.7	4.3	1.0	4.9
Mountain	5.8	6.1	0.1	6.2
Pacific[b]	42.4	13.2	33.5	44.9

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] Includes contracts with other government agencies.

[b] Includes Alaska and Hawaii.

MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1984, 1985 and 1986
(Millions of Dollars)

Agency, Type and Model	1984	1985[E]	1986[E]
AIR FORCE			
AGM-130	$ 8.4	$ 17.0	$ 55.0
ALCM	35.9	25.0	14.2
AMRAAM[b]	190.7	209.7	101.4
*ASMS	74.3	98.0	173.9
GLCM	36.1	18.7	0.7
IIR Maverick[h]	6.5	—	—
Peacekeeper (M-X)	1,962.6	1,699.7	804.1
*Small ICBM in Hard Mobile Basing	345.4	461.5	624.5
NAVY			
Harm[b]	$ 10.1	$ 6.3	$ 6.5
Hawk[f]	32.6	18.8	5.2
Laser Maverick[f]	1.9	2.0	—
Phoenix	2.6	—	—
RAM	7.9	4.9	10.9
Sidearm[g]	3.6	1.9	3.9
Sidewinder	—	—	13.6
Standard	31.4	40.7	47.2
Tomahawk	128.6	74.4	68.8
Trident I	23.3	—	—
Trident II	1,452.7	2,035.4	2,156.2
ARMY			
Laser Hellfire[c]	$ 4.3	$ 2.9	$ 6.2
MLRS	3.5	1.9	—
Patriot	78.3	61.1	53.1
Pershing II	21.7	—	—
Stinger	—	5.0	18.6
TOW 2	4.8	9.9	11.8
*Joint Tactical Missile System (JTACMS)[d]	50.2	76.4	154.8
Remotely Piloted Vehicles (RPVs)	139.5	101.6	56.0
Chaparral	20.2	17.5	17.7

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: See Missile Programs Chapter for missile program procurement authorization data.
E Estimate. Latest year reflects Administration's budget proposal.
a Total Obligational Authority.
b Navy and Air Force funding.
c Army and Navy funding.
d Army and Air Force funding.
e Funds transferred to DoD Strategic Defense Initiatives in FY1985.
f Marine Corps funding.
g Navy and Marine Corps funding.
h Air Force, Navy and Marine Corps funding.
* Programs in R&D only.

MILITARY AIRCRAFT PROGRAMS RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1984, 1985 and 1986
(Millions of Dollars)

Agency, Type and Model	1984	1985[E]	1986[E]
AIR FORCE			
B-1B	$737.2	$465.0	$367.4
*C-17	25.7	123.3	453.7
F-15 C/D/E Eagle	110.0	189.6	252.1
F-16 Multimission Fighter Falcon	98.6	94.6	94.9
KC-135 Re-engining/Modernization	6.7	4.0	1.0
LANTIRN (Night Precision Attack)	58.1	98.3	40.8
Precision Location Strike System (PLSS)	72.9	79.1	63.1
MC-130H Combat Talon[b]	—	—	14.0
T-46A Next Generation Trainer	122.2	78.0	54.3
*Advanced Tactical Fighter[b]	34.1	94.3	242.9
*Aircraft Engine Component Improvement Program[b]	207.5	229.7	204.4
Range Control Aircraft	1.5	0.8	—
NAVY			
A-6E/F Intruder	$ 14.4	$ 69.1	$238.0
AV-8B	104.0	71.5	72.1
CH/MH-53E Super Stallion	28.8	13.1	2.3
E-2C Hawkeye	50.3	37.4	23.7
EA-6B Prowler	23.4	35.8	80.2
F-14A/D Tomcat	40.6	277.1	348.1
F/A-18 Hornet	19.8	29.9	58.3
P-3C Orion	9.0	29.8	48.7
SH-2F Seasprite (LAMPS MK-I)	6.2	13.9	0.8
SH-60B Seahawk LAMPS	7.1	14.5	16.0
AH-1T Sea Cobra	21.3	4.3	—
E-6A (ECX)	70.1	76.7	86.3
*T-45 Training System	24.9	67.6	114.1
SH-60F CV ASW	18.4	20.1	12.7
*Joint Services Adv. Vert. Lift Aircraft (JVX)[c]	86.7	186.4	608.6
ARMY			
OH-58D AHIP Modification	$ 54.1	$ 30.9	$ 6.8
AH-64 Attack Helicopter	21.4	27.7	17.5
UH-60A Blackhawk[d]	50.7	34.3	14.1
*ARTI/LHX	1.0	75.1	149.4

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: See Aircraft Production Chapter for aircraft program procurement authorization data.

[a] Total Obligational Authority.
[b] Air Force and Navy funding.
[c] Air Force, Navy and Marine Corps funding.
[d] Army, Navy and Air Force funding.
[E] Estimate. Latest year reflects Administration's budget proposal.
* Programs in R&D only.

FOREIGN TRADE

In 1984, a year in which the United States as a whole experienced the worst international trade deficit in its history ($111 billion), the aerospace industry once again recorded a strong positive trade balance. Although aerospace exports fell well below the previous year's level and aerospace imports climbed to a new record, the aerospace trade balance nonetheless topped the $10 billion level, as it has in every year since 1979.

The 1984 trade balance was $10.3 billion, which compares with $12.6 billion in 1983 and the all-time high of $13.1 billion in 1981. The 1984 surplus resulted from exports totaling $15 billion and imports amounting to $4.7 billion.

The composition of the aerospace export volume was roughly 65 percent civil products, 35 percent military, a ratio close to the previous year's. Both civil and military exports dropped below the 1983 levels, but the largest decrease was in civil aircraft, in particular commercial transports. Since sales figures are based on deliveries, which trail orders by two to three years, the transport decline reflects the reduced level of orders placed by airlines in the air transportation recession of the early 1980s. With improving airline financial health, orders are increasing and indications are that the jetliner sales curve bottomed in 1984 and is starting a new ascent.

Aerospace exports amounted to 7.1 percent of total U.S. exports; this compares with 8.2 percent in 1983 and an average of 7.4 percent over the five year span 1979-83.

Civil aerospace exports totaled $9.7 billion in 1984, down from $10.6 billion in 1983. Within the civil exports category, foreign deliveries of complete aircraft totaled $4.1 billion, which compares with $5.7 billion in the previous year. The industry delivered 83 airline-type transports valued at $3.2 billion; the comparable figures for 1983 were 129 aircraft worth $4.7 billion.

Exports of general aviation aircraft, in decline for several years, fell off again in 1984. In terms of dollar value, shipments dropped from $356 million in 1983 to $268 million in 1984; in numbers, deliveries fell from 519 to 425. Exports of civil helicopters increased slightly (up $2 million) and the number of units increased from 216 to 233. Among other categories of civil aerospace exports, shipments of aircraft engines topped $1 billion, up $107 million from 1983. Exports of aircraft and engine parts similarly increased—to $4.5 billion from 1983's $4 billion.

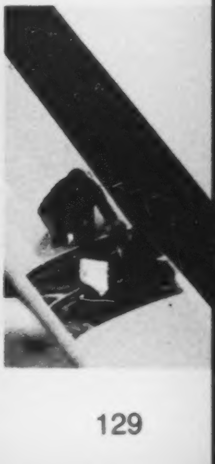
Military export sales totaled $5.4 billion, close to the previous year's $5.5 billion. The 1984 volume was made up of $1.6 billion in deliveries of complete aircraft (down from $1.8 billion in 1983); $141 million in aircraft engines (down from $172 million); $2.7 billion in aircraft and engine parts (up from $2.5 billion); and $962 million in guided missiles, rockets and parts (down $32 million). As is usually the case, the largest element of complete aircraft exports was in the fighter/fighter-bomber category. The industry delivered 110 such aircraft valued at $977 million; the comparable figures for 1983 were 93 aircraft worth $1.4 billion. The total number of aircraft delivered to foreign customers in 1984 was 381. Statistically, this was a very large drop from the 1983 figure of 936, but the latter figure was an anomaly caused by unusually large sales of used or rebuilt aircraft whose combined dollar value represented only a small portion of the military export total. Only six used/rebuilt aircraft were delivered in 1984, compared with 649 in 1983.

The record aerospace import figure of $4.7 billion was more than $100 million above the prior (1982) record and some $1.2 billion higher than 1983 imports. The latter figure was compounded of a civil import increase of approximately $700 million and a $500 million increase in military imports.

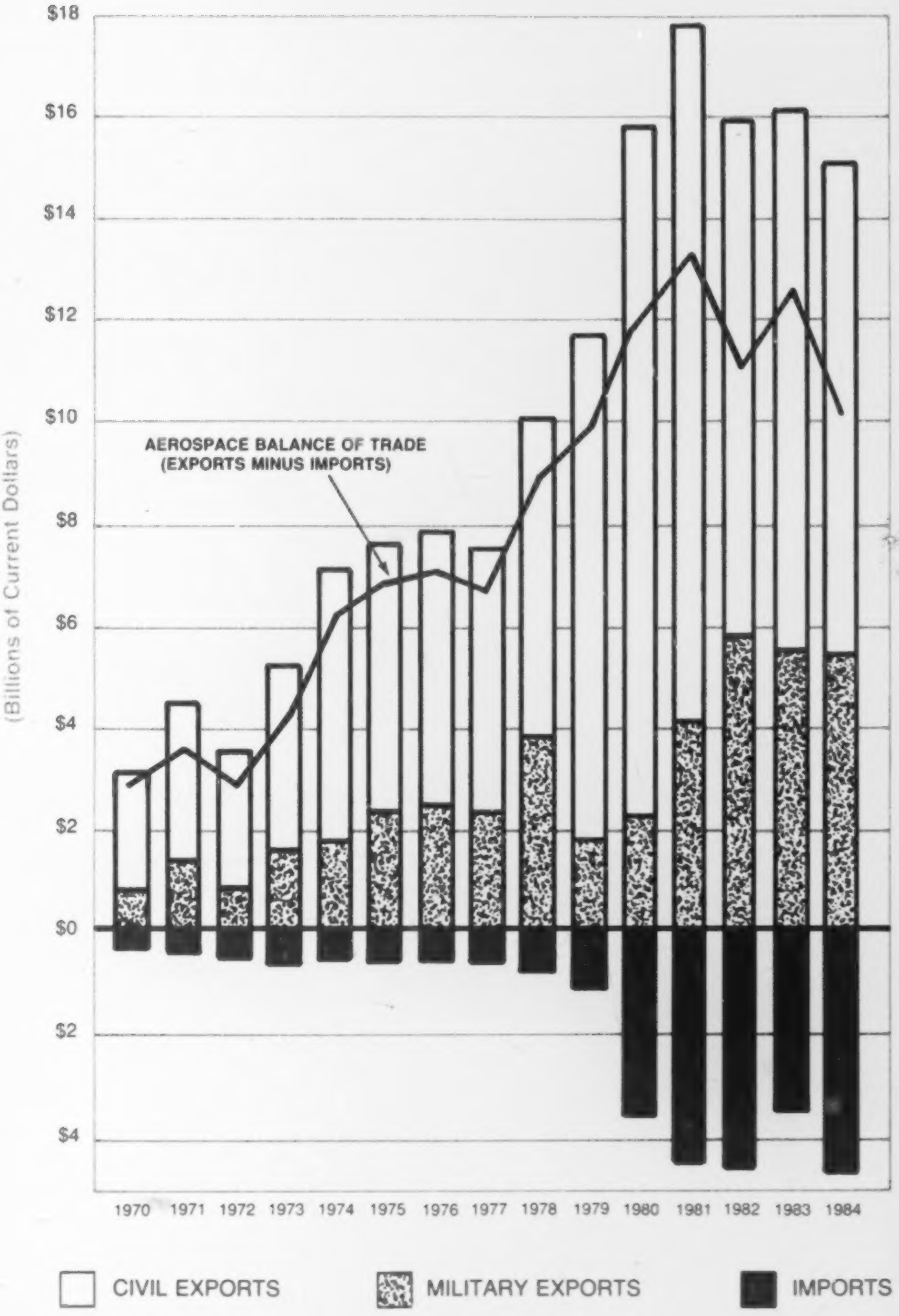
A substantial part of the civil import increase (about $100 million) was in airline transport aircraft; foreign manufacturers delivered eight BAe 146 medium transports and four Airbus jetliners, the latter on lease by Pan American World Airways but statistically counted as aircraft imports. General aviation imports amounted to $612 million (up $70 million); they numbered 207 units (up 45). Civil helicopter imports decreased sharply; they totaled 61 units valued at $51 million, compared with 100 units worth $90 million in 1983.

The major countries of destination for U.S. aerospace exports in 1984 were Japan ($1.3 billion), the United Kingdom ($1.3 billion), Canada ($1.1 billion) and France ($1 billion). The major countries of origin for U.S. aerospace imports were Canada ($1.4 billion), the United Kingdom ($1.2 billion) and France ($1.1 billion).

Royal Dutch Airlines
Missouri



AEROSPACE EXPORTS, IMPORTS, AND TRADE BALANCE



Source: Aerospace Industries Association

U.S. TOTAL AND AEROSPACE FOREIGN TRADE[a]

Calendar Years 1960-1984
(Millions of Dollars)

Year	Total U.S. Merchandise Trade					
	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports
1960	$ 5,369	$ 20,375	$ 15,006	$ 1,665	$ 1,726	$ 61
1961	6,096	20,754	14,658	1,501	1,653	152
1962	4,180	20,431	16,251	1,795	1,923	128
1963	6,061	23,062	17,001	1,532	1,627	95
1964	7,555	26,156	18,601	1,518	1,608	90
1965	5,875	27,127	21,252	1,459	1,618	159
1966	4,524	29,884	25,360	1,370	1,673	303
1967	4,409	31,142	26,733	1,961	2,248	287
1968	1,133	34,199	33,066	2,661	2,994	333
1969	1,599	37,462	35,863	2,831	3,138	307
1970	2,834	42,590	39,756	3,097	3,405	308
1971	(2,024)[b]	43,492	45,516	3,830	4,203	373
1972	(6,351)	48,959	55,310	3,230	3,795	565
1973	1,222	70,246	69,024	4,360	5,142	782
1974	(2,996)[b]	97,144	100,140	6,350	7,095	745
1975	9,630	106,561	96,931	7,045	7,792	747
1976	(7,786)	113,666	121,452	7,267	7,843	576
1977	(28,970)	119,006	147,976	6,850	7,581	731
1978	(33,541)	141,228	174,769	9,058	10,001	943
1979	(30,272)	178,798	209,070	10,123	11,747	1,624
1980	(27,336)	216,672	244,008	11,952	15,506	3,554
1981	(30,051)	228,961	259,012	13,134	17,634	4,500
1982	(35,182)	207,158	242,340	11,035	15,603	4,568
1983	(60,710)	195,969	256,679	12,619	16,065	3,446
1984	(110,932)	212,057	322,989	10,311	15,008	4,697

Source: Bureau of the Census, "Highlights of U.S. Export and Import Trade," Report FT990 (Monthly); "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually); "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

[a] Total U.S. and aerospace foreign trade are reported as (1) exports of domestic merchandise, including Department of Defense shipments, f.a.s. (= free alongside ship) basis, not seasonally adjusted, (2) imports for consumption, customs value basis, not seasonally adjusted, and (3) the difference (surplus or deficit) between exports and imports.

[b] First U.S. trade deficit since 1888.

U.S. EXPORTS OF AEROSPACE PRODUCTS[a] BY MAJOR COUNTRIES OF DESTINATION

Calendar Years 1980-1984
(Millions of Dollars)

Major Countries of Destination	1980	1981	1982	1983	1984
Australia	$ 363	$ 622	$ 312	$ 390	$ 445
Belgium/Luxembourg	412	263	213	281	247
Canada	945	1,252	909	1,014	1,121
Egypt	58	46	163	94	292
France	961	1,220	1,182	1,190	1,011
Germany, West	642	1,208	910	594	651
Israel	209	231	237	430	444
Italy	439	644	253	323	469
Japan	1,221	1,470	1,094	1,540	1,305
Korea, South	311	419	275	274	382
Netherlands	450	397	302	401	331
Saudi Arabia	306	692	525	380	419
Singapore	582	222	178	549	691
Taiwan	289	308	391	266	264
United Kingdom	1,641	1,075	736	1,087	1,276

Source: U.S. Department of Commerce, International Trade Administration.

[a] Includes all civil products, f.a.s. basis; excludes military products, which are not reported by country of destination.

U.S. IMPORTS OF AEROSPACE PRODUCTS[a] BY MAJOR COUNTRIES OF ORIGIN

Calendar Years 1980-1984
(Millions of Dollars)

Major Countries of Origin	1980	1981	1982	1983	1984
Canada	$ 927	$1,311	$1,200	$1,018	$1,397
France	599	826	827	726	1,109
Germany, West	75	101	97	124	121
Israel	99	156	126	73	142
Italy	79	92	124	113	143
Japan	117	160	200	177	173
Netherlands	128	99	109	49	124
Singapore	21	23	30	36	100
United Kingdom	976	1,311	1,122	933	1,163

Source: U.S. Department of Commerce, International Trade Administration.

[a] Includes civil and military products, c.i.f. basis.

U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1980-1984
(Millions of Dollars)

Aerospace Imports	1980	1981	1982	1983	1984
TOTAL	$3,554	$4,500	$4,568	$3,446	$4,697
TOTAL CIVIL	$3,228	$3,909	$3,875	$2,927	$3,671
Complete Aircraft—TOTAL	$1,316	$1,558	$1,599	$ 924	$1,301
Transports	285	196	231	188	270
General Aviation	496	913	838	542	612
Helicopters	54	105	85	90	51
Other, Including Used Aircraft, & Gliders, Balloons, & Airships	481	344	445	104	368
Aircraft Engines—TOTAL	731	1,046	797	617	750
Turbine Engines	720	1,041	787	602	738
Piston Engines	11	5	10	15	12
Aircraft and Engine Parts—TOTAL	1,181	1,305	1,479	1,386	1,620
Aircraft Parts and Accessories	199	230	301	267	317
Turbine Engine Parts	295	354	454	452	561
Piston Engine Parts	8	7	4	5	6
Spacecraft Parts, & Other Parts & Accessories	679	714	720	662	736
TOTAL MILITARY	$ 325	$ 592	$ 692	$ 519	$1,026
Complete Aircraft—TOTAL	$ 4	$ 42	$ 28	$ 3	$ 14
Aircraft Engines—TOTAL	29	8	16	4	124
Turbine Engines	28	8	16	3	123
Piston Engines Including Parts	1	(a)	(a)	1	1
Aircraft Engine Parts—TOTAL	292	542	648	512	888
Aircraft Parts	121	427	575	442	632
Turbine Engine Parts	34	50	47	52	163
Other Parts & Accessories	137	65	26	18	93

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NOTE: Detail may not add to totals because of rounding.

a Less than $500,000.

U.S. IMPORTS OF COMPLETE AIRCRAFT[1]

Calendar Years 1980-1984

Aircraft Imports	1980	1981	1982	1983	1984
TOTAL NUMBER OF AIRCRAFT	676	882	872	693	995
Civil Aircraft—TOTAL	653	852	852	679	951
New Complete Aircraft:					
Helicopters	177	213	184	100	61
General Aviation:					
Single-Engine	6	9	23	6	21
Multi-Engine Under 4400 lbs	6	2	13	18	33
Multi-Engine 4400-10,000 lbs	119	123	87	52	58
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs	156	218	151	86	61
Multi-Engine, Other, Including Turboshaft, 10,000-33,000 lbs					34
Transports (Multi-Engine, Over 33,000 lbs)	16	8	8	7	12
Other Civil Aircraft:					
Used or Rebuilt	100	160	186	181	223
Aircraft Previously Exported from U.S.	NA	NA	NA	NA	NA
Gliders	73	119	200	229	448
Balloons & Airships	NA	NA	NA	NA	NA
Military Aircraft—TOTAL	23	30	20	14	44
New Complete Aircraft	23	25	17	7	43
Gliders	—	5	3	7	1
Balloons & Airships	NA	NA	NA	NA	NA

(Continued on next page)

U.S. IMPORTS OF COMPLETE AIRCRAFT[r]
(Continued)

Aircraft Imports	1980	1981	1982	1983	1984
TOTAL VALUE OF AIRCRAFT (Millions of Dollars)	$1,320.0	$1,599.7	$1,626.8	$926.8	$1,314.6
Civil Aircraft—TOTAL	$1,315.8	$1,558.1	$1,598.9	$923.8	$1,300.5
New Complete Aircraft:					
Helicopters	53.9	105.4	84.9	89.5	51.3
General Aviation:					
Single-Engine	0.3	0.8	2.0	0.4	1.5
Multi-Engine Under 4400 lbs	1.2	0.1	1.7	2.5	4.2
Multi-Engine 4400-10,000 lbs	95.2	123.7	104.3	72.6	100.1
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs	399.1	788.4	729.7	466.4	343.8
Multi-Engine, Other, Including Turboshaft, 10,000-33,000 lbs					162.1
Transports (Multi-Engine, Over 33,000 lbs)	285.5	195.5	231.4	188.0	269.7
Other Civil Aircraft:					
Used or Rebuilt	133.9	122.3	112.0	72.8	351.8
Aircraft Previously Exported from U.S.	344.9	220.0	330.0	27.9	8.8
Gliders	1.5	1.6	2.6	3.5	3.6
Balloons & Airships	0.3	0.3	0.3	0.2	3.6
Military Aircraft—TOTAL	4.2	41.6	27.9	3.0	14.1
New Complete Aircraft	4.0	41.4	27.9	2.7	14.0
Gliders	—	(*a*)	(*a*)	0.2	(*a*)
Balloons & Airships	0.2	0.2	(*a*)	0.1	0.1

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NA Not available.

r Revised to show units and values for all products as civil or military, and to include value of imports of aircraft previously exported from the U.S.

a Less than $50,000.

TOTAL U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1960-1984
(Millions of Dollars)

Year	TOTAL Exports[a] of U.S. Merchandise	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Total	Trans-ports	
1960	$ 20,375	$ 1,726	8.5%	$1,089	$ 480	$ 637
1961	20,754	1,653	8.0	878	263	775
1962	20,431	1,923	9.4	910	259	1,013
1963	23,062	1,627	7.1	732	191	895
1964	26,156	1,608	6.1	764	211	844
1965	27,127	1,618	6.0	854	353	764
1966	29,884	1,673	5.0	1,035	421	638
1967	31,142	2,248	7.2	1,380	611	868
1968	34,199	2,994	8.8	2,289	1,200	705
1969	37,462	3,138	8.4	2,027	947	1,111
1970	42,590	3,405	8.0	2,516	1,283	889
1971	43,492	4,203	9.7	3,080	1,567	1,123
1972	48,959	3,795	7.8	2,954	1,119	841
1973	70,246	5,142	7.3	3,788	1,664	1,354
1974	97,144	7,095	7.3	5,273	2,655	1,822
1975	106,561	7,792	7.3	5,324	2,397	2,468
1976	113,666	7,843	6.9	5,677	2,468	2,166
1977	119,006	7,581	6.4	5,049	1,936	2,532
1978	141,228	10,001	7.1	6,018	2,558	3,983
1979	178,798	11,747	6.6	9,772	4,998	1,975
1980	216,672	15,506	7.2	13,248	6,727	2,258
1981	228,961	17,634	7.7	13,312	7,180	4,322
1982	207,158	15,603	7.5	9,608	3,834	5,995
1983	195,969	16,065	8.2	10,595	4,683	5,470
1984	212,057	15,008	7.1	9,659	3,195	5,350

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually); "Highlights of U.S. Export and Import Trade," Report FT 990 (Monthly).

NOTE Detail may not add to totals because of rounding.

[a] Exports of domestic merchandise including DOD shipments.

U.S. EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1980-1984
(Millions of Dollars)

Aerospace Exports	1980	1981	1982	1983	1984
TOTAL	$15,506	$17,634	$15,603	$16,065	$15,008
TOTAL CIVIL	$13,248	$13,312	$ 9,608	$10,595	$ 9,659
Complete Aircraft—TOTAL	$ 8,256	$ 8,613	$ 4,848	$ 5,691	$ 4,147
Transports	6,727	7,180	3,834	4,683	3,195
General Aviation[a]	739	790	517	356	268
Helicopters	299	346	206	232	234
Other, Including Used	491	297	291	420	450
Aircraft Engines—TOTAL	556	784	763	950	1,057
Turbine Engines	514	739	721	914	1,021
Piston Engines	42	45	42	36	36
Aircraft and Engine Parts Incl. Spares—TOTAL	4,436	3,915	3,997	3,954	4,455
Aircraft Parts & Accessories	3,296	2,960	2,857	2,742	3,094
Aircraft Engine Parts	1,140	955	1,140	1,212	1,361
TOTAL MILITARY	$ 2,258	$ 4,322	$ 5,995	$ 5,470	$ 5,350
Complete Aircraft—TOTAL[b]	$ 949	$ 1,712	$ 2,388	$ 1,845	$ 1,581
Fighters & Fighter Bombers	449	1,006	1,473	1,379	977
Transports	231	158	341	112	85
Helicopters	88	177	156	62	83
Other, Including Used	181	371	418	292	436
Aircraft Engines—TOTAL	63	83	140	172	141
Turbine Engines	58	78	136	162	125
Piston Engines	5	5	4	10	16
Aircraft and Engine Parts Incl. Spares—TOTAL	497	1,971	2,341	2,459	2,666
Aircraft Parts & Accessories	369	1,475	1,845	2,058	2,241
Aircraft Engine Parts	128	496	496	401	425
Guided Missiles, Rockets, & Parts—TOTAL	749	556	1,126	994	962
Guided Missiles & Rockets	327	213	716	443	288
Missile & Rocket Parts	393	313	378	499	646
Missile & Rocket Engines	13	4	8	28	16
Missile & Rocket Engine Parts	16	26	24	24	12

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

[b] Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

U.S. EXPORTS OF CIVIL AIRCRAFT

Calendar Years 1980-1984

Civil Aircraft Exports	1980	1981	1982	1983	1984
TOTAL NUMBER OF AIRCRAFT	4,434	3,826	1,557	1,088	1,045
Helicopters—TOTAL	525	453	254	216	233
Under 2200 lbs	335	268	162	141	155
Over 2200 lbs	190	185	92	75	78
General Aviation—TOTAL	3,178	2,617	940	519	425
Single-Engine	2,172	1,800	539	279	271
Multi-Engine, Under 4400 lbs	546	371	167	106	53
Multi-Engine, 4400-10,000 lbs ...	432	426	209	112	83
Multi-Engine, 10,000-33,000 lbs .	28	20	25	22	18
Transports—TOTAL	237	255	121	129	83
Passenger Aircraft, Over 33,000 lbs	215	236	110	122	77
Cargo Aircraft, Over 33,000 lbs ..	8	7	6	2	3
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi	14	12	5	5	3
Other Aircraft—TOTAL	494	501	242	224	304
Used or Rebuilt Aircraft	494	501	242	224	304
Other Aircraft, Including Balloons, Gliders & Kites	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$8,256	$8,613	$4,848	$5,691	$4,147
Helicopters—TOTAL	$ 299	$ 346	$ 206	$ 232	$ 234
Under 2200 lbs	82	71	45	35	45
Over 2200 lbs	217	275	161	197	189
General Aviation—TOTAL	739	790	517	356	268
Single-Engine	114	105	36	23	34
Multi-Engine, Under 4400 lbs	88	72	35	21	13
Multi-Engine, 4400-10,000 lbs ...	454	526	309	155	99
Multi-Engine, 10,000-33,000 lbs .	83	87	137	157	122
Transports—TOTAL	6,727	7,180	3,834	4,683	3,195
Passenger Aircraft, Over 33,000 lbs	5,511	6,087	3,310	4,415	2,998
Cargo Aircraft, Over 33,000 lbs ..	480	363	216	37	62
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi	736	730	308	231	135
Other Aircraft—TOTAL	491	297	291	420	450
Used or Rebuilt	486	235	218	298	293
Other, Including Balloons, Gliders & Kites	5	62	73	122	157

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NA Not available.

U.S. EXPORTS OF CIVIL HELICOPTERS

Calendar Years 1980-1984

Region of Destination	1980	1981	1982	1983	1984
TOTAL NUMBER EXPORTED	525	453	254	216	233
Canada & Greenland	91	78	17	16	8
Latin America & Caribbean	143	140	63	38	32
Europe	118	71	49	51	89
Middle East	21	21	13	48	12
Asia	57	70	38	44	62
Oceania	72	32	21	8	25
Africa	23	41	53	11	5
TOTAL VALUE (Millions of Dollars)	$298.7	$346.4	$205.9	$232.1	$233.8
Canada & Greenland	$ 42.9	$ 40.6	$ 15.2	$ 9.7	$ 4.1
Latin America & Caribbean	78.4	89.5	49.5	47.0	42.0
Europe	79.4	91.8	42.0	50.7	52.8
Middle East	24.9	27.2	12.9	48.6	16.3
Asia	51.3	65.3	50.4	59.2	107.5
Oceania	16.3	19.5	10.6	1.1	9.3
Africa	5.5	12.5	25.3	15.8	1.8

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

U.S. IMPORTS OF CIVIL HELICOPTERS

Calendar Years 1980-1984

Country of Origin	1980	1981	1982	1983	1984
TOTAL NUMBER IMPORTED	177	213	184	100	61
France	167	193	167	46	13
Germany	9	12	15	48	16
Italy	1	8	1	1	30
United Kingdom	—	—	1	5	2
TOTAL VALUE (Millions of Dollars)	$ 53.9	$105.4	$ 84.9	$ 89.5	$51.3
France	$ 48.4	$ 92.4	$ 74.2	$ 39.6	$14.9
Germany	4.4	6.9	8.9	35.8	9.7
Italy	1.1	6.1	1.1	0.8	19.2
United Kingdom	—	—	0.7	13.3	7.5

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

U.S. EXPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1980-1984

Region of Destination	1980	1981	1982	1983	1984
TOTAL NUMBER EXPORTED	3,178	2,617	940	519	425
Canada & Greenland	414	336	94	43	49
Latin America & Caribbean	1,452	1,220	348	204	108
Europe	760	442	226	102	113
Middle East	19	23	32	13	10
Asia	55	57	40	30	47
Oceania	253	301	113	43	62
Africa	225	238	87	84	36
TOTAL VALUE (Millions of Dollars)	$ 739.5	$ 789.5	$516.6	$356.0	$267.8
Canada & Greenland	$ 49.9	$ 57.7	$ 19.3	$ 13.6	$ 23.7
Latin America & Caribbean	239.5	279.6	166.3	66.0	33.3
Europe	235.0	219.7	178.3	92.9	60.6
Middle East	65.1	30.2	18.6	86.2	62.2
Asia	36.9	39.1	25.3	31.4	48.1
Oceania	52.6	75.8	45.1	16.1	8.6
Africa	60.5	87.4	63.7	49.8	31.3

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

U.S. IMPORTS OF GENERAL AVIATION AIRCRAFT

Calendar Years 1980-1984

Country of Origin	1980	1981	1982	1983	1984
TOTAL NUMBER IMPORTED	287	352	274	162	207
Brazil	20	37	24	15	14
Canada	38	51	58	38	27
France	48	59	48	19	30
Israel	33	42	22	9	24
Japan	56	70	52	17	15
Netherlands	4	1	—	—	3
United Kingdom	62	67	36	36	53
Other	26	25	34	28	41
TOTAL VALUE (Millions of Dollars)	$495.8	$913.0	$837.7	$541.9	$611.7
Brazil	$ 21.7	$ 54.0	$ 40.2	$ 26.9	$ 23.9
Canada	88.2	243.0	306.9	208.4	159.6
France	141.8	248.2	222.6	104.3	95.7
Israel	79.2	123.8	72.9	31.7	85.2
Japan	21.7	34.3	37.7	16.2	14.8
Netherlands	20.7	10.2	—	—	18.2
United Kingdom	107.1	183.7	143.9	137.0	198.1
Other	15.4	15.8	13.5	17.4	16.2

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

U.S. EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT

33,000 Pounds and Over Airframe Weight
Calendar Years 1980-1984

Region of Destination	1980	1981	1982	1983	1984
TOTAL NUMBER EXPORTED	237	255	121	129	83
Canada	22	25	13	8	6
Latin America & Caribbean	31	35	13	8	3
Europe	109	108	31	57	34
Middle East	9	21	13	10	9
Asia	53	34	25	30	23
Oceania	7	19	8	4	2
Africa	6	13	18	12	6
TOTAL VALUE (Millions of Dollars)	$6,727	$7,180	$3,834	$4,683	$3,195
Canada	$ 299	$ 584	$ 294	$ 280	$ 265
Latin America & Caribbean	640	1,027	301	304	69
Europe	2,670	2,528	938	1,785	1,008
Middle East	236	841	699	291	242
Asia	2,467	1,405	1,096	1,464	1,165
Oceania	179	559	234	180	137
Africa	236	236	272	379	309

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

U.S. EXPORTS OF MILITARY AIRCRAFT[a]

Calendar Years 1980-1984

	1980	1981	1982	1983	1984
TOTAL NUMBER OF AIRCRAFT	462	508	637	936	381
Fighters & Fighter Bombers	90	113	154	93	110
Transports	23	22	32	15	6
Helicopters	89	68	55	55	32
New Aircraft, NEC	220	156	228	124	227
Used or Rebuilt Aircraft	40	149	168	649	6
Airships, Balloons, Gliders, etc.	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$949	$1,712	$2,388	$1,845	$1,581
Fighters & Fighter Bombers	$449	$1,006	$1,473	$1,378	$ 977
Transports	231	158	341	112	85
Helicopters	88	177	156	62	83
New Aircraft, NEC	148	306	361	248	410
Used or Rebuilt Aircraft	2	15	16	22	6
Airships, Balloons, Gliders, etc.	31	50	41	23	20

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NEC Not elsewhere classified.
NA Not available
a Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

U.S. EXPORTS OF AIRCRAFT ENGINES

Calendar Years 1982-1984
(Millions of Dollars)

	1982		1983		1984	
	Number	Value	Number	Value	Number	Value
TOTAL	4,916	$903	3,698	$1,122	3,815	$1,199
Turbine Engines-New	1,491	$644	1,104	$ 743	828	$ 706
Civil	1,213	517	890	597	573	589
Military	278	127	214	146	255	117
Turbine Engines-Used	646	213	677	333	744	441
Civil	530	204	550	317	691	433
Military	116	9	127	16	53	8
Piston Engines	2,779	46	1,917	46	2,243	52
Civil, New, Under 500 HP	1,282	19	776	9	855	12
Civil, New, Over 500 HP	96	6	139	11	100	4
Civil, Used	1,150	17	863	16	1,198	20
Military	251	4	139	10	90	16

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

U.S. IMPORTS OF TURBINE AIRCRAFT ENGINES[a]

Calendar Years 1982-1984
(Millions of Dollars)

	1982		1983		1984	
	Number	Value	Number	Value	Number	Value
Turbine Engines	1,978	$803	1,448	$605	2,185	$861
Civil	1,854	787	1,343	602	1,832	738
Military	124	16	105	3	353	123

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

[a] New and used.

EXPORT-IMPORT BANK LENDING AUTHORITY AND GROSS AUTHORIZATIONS SUMMARY

Fiscal Years 1977-1986
(Millions of Dollars)

LOANS[a]

Year	Lending Authority[c]	Authorizations Summary				
		TOTAL Direct Loans[a]	Regular Loans			Discount Loans, Medium Term, and Small Business Credits
			Total Regular Loans[a]	Direct Credits	CFF[b] & Relending	
1977	$2,490	$1,221	$ 747	$ 700	$ 47	$ 474
1978	3,600	3,425	2,927	2,872	55	497
1979	3,750	4,475	3,825	3,725	100	650
1980	4,001	4,578	4,087	4,045	42	491
1981	5,461	5,431	5,079	5,045	34	352
1982	4,400	3,516	3,104	3,104	(*b*)	412
1983	4,400	845	685	685	(*b*)	160
1984	3,865	1,465	1,122	1,122	(*b*)	343
1985[E]	3,865	NA	NA	NA	(*b*)	NA
1986[E]	—	NA	NA	NA	(*b*)	NA

GUARANTEES AND INSURANCE

Year	Lending Authority	Authorizations Summary		
		TOTAL Guarantees and Insurance	Guarantees	Insurance
1977	$ (*d*)	$4,379	$1,021	$3,358
1978	(*d*)	3,951	589	3,362
1979	(*d*)	5,016	908	4,108
1980	(*d*)	8,032	2,510	5,522
1981	8,059	7,416	1,506	5,910
1982	9,220	5,832	727	5,105
1983	9,000	8,525	1,741	6,784
1984	10,000	7,151	1,333	5,818
1985[E]	10,000	NA	NA	NA
1986[E]	12,000[f]	NA	NA	NA

Source: Export-Import Bank of the United States.

NOTE: Detail may not add to totals because of rounding.

[a] Discount Loans excluded from loan lending authority limitation until FY 1981. Comparable authorization data for 1980 and prior years are therefore listed under Total Regular Loans, which include Direct Credits, CFF and Relending Loans. For 1981 and subsequent years, compare TOTAL Direct Loans authorization data with Lending Authority, both of which include Discount Loans. The value of Loans may exceed Lending Authority because of the inclusion in Loans of the full amount of Certificates of Loan Participation (COLPs), portions of which are subsequently sold to commercial banks.

[b] CFF (Cooperative Financing Facility) program discontinued after 1981.

[c] Effective 1981, lending authority includes discount loans as well as direct loans.

[d] Limitation for Guarantees and Insurance began in 1981.

[E] Estimate. Latest year represents Administration's budget proposal.

[f] Includes $1,800 million proposed I-MATCH Program, which would replace direct lending and would allow an estimated $100 million in commercial loan interest buy-down.

NA Not available.

EXPORT-IMPORT BANK
TOTAL AUTHORIZATIONS OF LOANS AND GUARANTEES AND AUTHORIZATIONS IN SUPPORT OF AIRCRAFT EXPORTS[r]

Fiscal Years 1974-1984
(Millions of Dollars)

Year	TOTAL AUTHORIZATIONS	Authorizations in Support of Aircraft Exports			
		TOTAL	Percent of TOTAL Authorizations	Commercial Jet Aircraft[a]	Other Aircraft[b]
LOANS[c]					
1974	$4,905	$1,017.2	20.7%	$ 894.6	$122.6
1975	3,813	795.6	20.9	691.2	104.4
1976	3,489	475.5	13.6	398.4	77.1
Tr. Qtr.	448	98.3	21.9	93.8	4.5
1977	1,221	156.1	12.8	137.6	18.5
1978	3,425	237.8	6.9	189.5	48.3
1979	4,475	1,469.4	32.8	1,399.4	70.0
1980	4,578	1,743.3	38.1	1,692.6	50.7
1981	5,431	2,576.6	47.4	2,550.3	26.3
1982	3,516	263.9	7.5	199.1	64.8
1983	845	396.7	46.9	383.8	12.9
1984	1,465	608.0	41.5	531.8	76.2
GUARANTEES[d]					
1974	$1,594	$ 154.0	9.7%	$ 132.9	$ 21.1
1975	1,574	84.5	5.4	64.0	20.5
1976	1,661	107.6	6.5	87.2	20.4
Tr. Qtr.	272	62.6	23.0	58.7	3.9
1977	1,021	307.5	30.1	293.9	13.6
1978	589	97.6	16.6	77.2	20.4
1979	908	261.4	28.8	239.3	22.1
1980	2,510	1,131.9	45.1	1,088.1	43.8
1981	1,506	562.6	37.4	533.4	29.2
1982	727	104.2	14.3	78.4	25.8
1983	1,741	629.6	36.2	601.3	28.3
1984	1,333	355.5	26.7	293.5	62.0

Source: Export-Import Bank of the United States.

[a] Includes complete aircraft, related engines and parts, and retrofits.

[b] Includes business aircraft, general aviation aircraft, helicopters, and related goods and services. Data revised to include Discount Loans.

[c] Loans are commitments for financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits, loans authorized under the Cooperative Financing Facility (CFF), (until the termination of the CFF program in 1981), and Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is also included with Guarantees.

[d] Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions. Excludes insurance.

[r] Revised to include Discount Loans and corrected data.

EXPORT-IMPORT BANK
SUMMARY OF COMMERCIAL JET AIRCRAFT AUTHORIZATIONS FOR LOANS[a] AND GUARANTEES[b]

Fiscal Years 1957-1984
(Values in Millions of Dollars)

Year	No. of Jet Aircraft[c]		Export Value[c]		No. of New Commitments		Gross Authorizations	
	Loans	Guar-antees	Loans	Guar-antees	Loans	Guar-antees	Loans	Guar-antees
New Authorizations:								
1957[d]-1968	322	53	$ 2,572	$ 331	92	58	$ 1,520	$ 274
1969	55	23	451	207	23	18	197	111
1970	142	1	1,749	3	44	38	598	79
1971	126	9	1,539	40	58	49	481	363
1972	145	2	1,334	9	44	29	475	183
1973	129	4	1,729	25	60	23	690	191
1974	189	—	2,195	—	79	22	895	133
1975	136	1	2,070	5	64	10	691	64
1976	77	6	1,017	139	34	11	398	87
Tr. Qtr.	15	5	219	182	6	3	94	59
1977	31	25	330	902	16	14	138	294
1978	29	5	479	253	18	5	189	77
1979	118	7	2,938	317	35	10	1,399	239
1980	136	21	3,975	901	36	24	1,693	1,088
1981	121	18	4,568	637	26	17	2,550	533
1982	11[r]	6[r]	441	113	5	2	199	78
1983	21[r]	9[r]	779	619[r]	3	4	384	601[r]
1984	37	8	1,023	327	7	4	532	294
Cumulative New Authorizations[r]	1,840	203	29,406	5,011	650	341	13,123	4,748
Transfers, Reversals, & Participation	—	—	(8)	—	4	—	(140)[r]	(20)
Cumulative Gross Authorizations (net of Adjustments)[r]	1,840	203	29,398	5,011	654	341	12,983	4,728

Source: Export-Import Bank of the United States.
NOTE: Detail may not add to totals because of rounding.

[a] Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF) until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is included with Guarantees.

[b] Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

[c] For Export-Import Bank commitments including both loan and guarantee authorization, number of aircraft and export value reported under "Loans."

[d] First year of commercial jet aircraft authorizations.

[r] Revised.

EXPORT-IMPORT BANK AUTHORIZATIONS OF LOANS AND GUARANTEES IN SUPPORT OF EXPORTS OF COMMERCIAL JET AIRCRAFT

Fiscal Years 1982-1984
(Values in Millions of Dollars)

Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorization				
			Loans (Direct Credits)				Guarantees
			Amount	Percent Coverage[a]	Interest Rate	Repayment Terms[b]	Amount
FY 1984							
TOTALS	45 aircraft	$1,350.3	$531.8	—	—	—	$293.5
Angola/Banco Nacional	1 X 737-200	$ 18.5	$ —	—%	—%	—	$ 12.0
Canada/Canadian Pacific	5 X 737-300	129.1	80.7	62.5	12.00	15-S	—
Denmark/Maersk Air	2 X 737-300	52.3	32.7	62.5	12.00	15-S	—
Egypt/Egyptair	3 X 767-200	173.0	147.0	85.0	12.00-12.50	20-S	—
Ethiopia/Ethiopian Airlines	2 X 767-200	113.1	—	—	—	—	48.0
Finland/Finnair	1 X MD-80	26.5	14.0	52.7	12.00	20-S	—
Italy/Alitalia	16 X MD-80	412.9	145.5	35.2	12.00	10-S	145.5
Japan/All Nippon Airways	5 X 767-200	195.5	—	—	—	—	88.0
Jordan/Alia	4 X L-1011-500	72.0	45.0	62.5	12.00	15-S	—
Pakistan/Pakistan Int'l	6 X 737-300	157.4	66.9	42.5	12.00	10-S	—
FY 1983							
TOTALS	30 aircraft	$1,398.8	$383.7	—	—	—	$601.3
Algeria/Air Algerie	3 X 737	$ 58.0	$ —	—%	—%	—	$ 49.3
Finland/Finnair	3 X MD-80	57.4	35.8	62.5	12.00	20-S	—
Italy/Alitalia	14 X MD-80	358.0	75.0	21.0	12.00	7-S	150.0
Singapore/Singapore Airlines	6 X 747-300[c]	558.3[c]	—	—	—	—	362.9[c]
(3 parts of one commitment)	Spare P & W engines[c]	179.9[c]	134.9[c]	75.0	12.00	18-S	18.0[c]
	4X 757	184.0	138.0	75.0	10.00	20-S	18.4
Yugoslavia	2 X 727 mods.[d]	3.2[d]	—	—	—	—	2.7

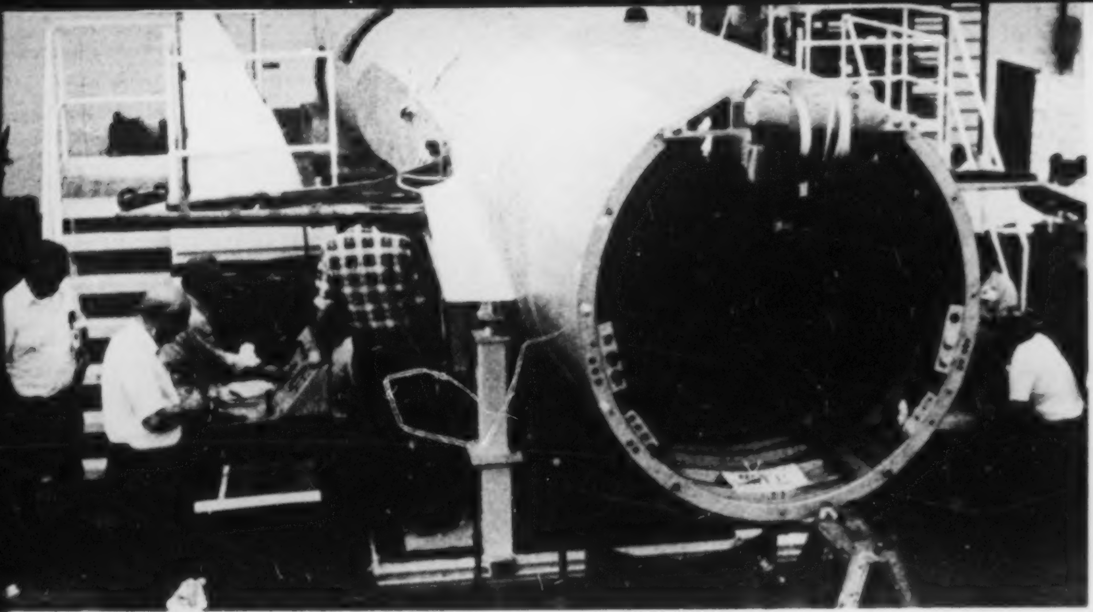
(Continued on next page)

EXPORT-IMPORT BANK
LOAN AND GUARANTEE AUTHORIZATIONS (Continued)

Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorization				
			Loans (Direct Credits)				Guarantees
			Amount	Percent Coverage	Interest Rate	Repayment Terms[b]	Amount
FY 1982							
TOTALS	17 aircraft	$ 554.6	$199.1	—	—	—	$ 78.4
Austria/Austrian Airlines	3 X MD-80	$ 71.6	28.6	40.0%	8.00%	20-S	$ —
Brazil/Transbrasil S.A. Lineas Aereas	2 X 727[i]	—	18.1[i]	—	—	10-S	—
	3 X 767[i]	—	—	—	—	—	5.6[i]
Canada/Pacific Western	4 X 767-200[e]	201.8[e]	83.2[e]	41.2	9.25-12.00	10-S	—
Ivory Coast/Air Afrique	1 X 747	106.5	45.3	42.5	12.00	10-S	—
Morocco/Royal Air Maroc	2 X 737	38.7	—	—	—	—	25.2
Netherlands Antilles/ALM	2 X MD-80	44.2	18.8	42.5	12.00	10-S	—
New Zealand/Air New Zealand	1 X 737	17.0	5.1	30.0	12.00	8-S	—
Nigeria/Nigeria Airways	4 X 737	70.3	—	—	—	—	45.7
Sri Lanka/U.S. Trust Co.	1 X L-1011[f]	4.5[f]	—	—	—	—	1.9[f]

Source: Aerospace Industries Association, based on data from the Export-Import Bank of the United States.
NOTE: For definitions of Loans and Guarantees, see Export-Import Bank tables on previous pages.

[a] Amount of loan as percent of export value.
[b] Number of payments and frequency (S = semi-annual)
[c] Loan and guarantee authorization for 747s and P&W engines for Singapore Airlines approved in FY1983 and included in FY1983 gross authorizations TOTALS; subsequently not accepted by customer, and cancelled in FY1984.
[d] Export value of additional equipment and parts for aircraft modifications.
[e] Loan reduced in FY1983 to $40.7 million for 2 aircraft with export value of $75.8 million.
[f] Reflects higher selling cost than earlier estimated.
[i] Increased financing for previous authorization; FY TOTALS include increase in authorization amount and any additional export value, but exclude number of aircraft and original export value, which were counted in year of original authorization.



EMPLOYMENT

The aerospace industry's average employment in 1984 was 1,200,000, a gain of 61,000—more than five percent—over the 1983 average of 1,139,000. The 1984 figure represented 6.1 percent of the total employment in all U.S. manufacturing industries, a slight dip from the previous year's 6.2 percent.

The annual average figure, the customary employment yardstick in this publication, is well below the year-end employment total because the labor force increased unevenly in 1984, with the greater growth coming in the year's second half. At year-end 1984, industry employment reached 1,252,000, the highest level since the peak years of the latter 1960s when the industry was simultaneously engaged in Vietnam war production, the Apollo lunar landing program and large-scale production of wide-body jetliners. Aerospace Industries Association estimates that industry employment will further increase by 3.8 percent in 1985, under the combined impetus of continuing high activity in defense/space production and uptrending activity in the hitherto depressed commercial aircraft manufacturing segment. Such an increase will boost employment to 1,299,000 by year-end 1985.

On the annual average basis, the industry recorded employment gains in all major categories. Employment among companies manufacturing aircraft, engines and parts—a category that had been in decline for three prior years—increased by 23,000 to 602,000, roughly half the industry's total work force. Among companies fabricating missiles and space systems, employment rose by 13,000 to 153,000, while the labor force engaged in production of avionics equipment grew by 11,000 to a year's average of 167,000. The "other parts and equipment" category increased by 14,000 to 278,000.

The number of production workers on the industry's rolls (again on the annual average basis) increased more than four percent, from 1983's 518,000 to 539,000 in 1984. The gains extended across the board: an increase of 6,000 in aircraft, engines and parts manufacture to a total of 288,000; 6,000 in missiles/space (total 51,000); 4,000 in avionics (total 74,000); and 5,000 in the "other" category (total 126,000).

Reflecting increasing research and development activity, aerospace industry employment of scientists and engineers working in those functions rose moderately from 95,500 in 1983 to 97,500 in 1984; the aerospace increase—two percent—compared with an all-industry gain of three percent. In 1984, the aerospace R&D scientist/engineer component represented 18.1 percent of total R&D scientists and engineers employed by all U.S. industries; that figure compares with 18.3 percent in 1983.

The geographic distribution of aerospace employment, which has changed only slightly in recent years, shows that the Pacific region continued to dominate in 1984 with 41.2 percent ot the total. Next, in order, were the Middle Atlantic region (15 percent), New England (12.7 percent), West North Central (9.6 percent), South Atlantic (8.9 percent), South Central (6.4 percent), Mountain (4.1 percent) and East North Central (2.1 percent).

ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING, DURABLE GOODS AND AEROSPACE INDUSTRIES

Calendar Years 1961-1984
(Thousands of Employees)

Year	All Manufacturing Industries	Durable Goods Industries	Aerospace Industry		
			TOTAL	As Percent of	
				All Manufacturing	Durable Goods
1961	16,326	9,070	1,178	7.2%	13.0%
1962	16,853	9,480	1,270	7.5	13.4
1963	16,995	9,616	1,267	7.5	13.2
1964	17,274	9,816	1,209	7.0	12.3
1965	18,062	10,405	1,175	6.5	11.3
1966	19,214	11,282	1,375	7.2	12.2
1967	19,447	11,439	1,484	7.6	13.0
1968	19,781	11,626	1,502	7.6	12.9
1969	20,167	11,895	1,402	7.0	11.8
1970	19,367	11,208	1,166	6.0	10.4
1971	18,623	10,636	951	5.1	8.9
1972	19,151	11,049	912	4.8	8.3
1973	20,154	11,891	956	4.7	8.0
1974	20,077	11,925	982	4.9	8.2
1975	18,323	10,688	941	5.1	8.8
1976	18,997	11,077	896	4.7	8.1
1977	19,682	11,597	893	4.5	7.7
1978	20,505	12,274	977	4.8	8.0
1979	21,040	12,760	1,109	5.3	8.7
1980	20,285	12,187	1,185	5.8	9.7
1981	20,170	12,109	1,201	6.0	9.9
1982[r]	18,781	11,039	1,158	6.2	10.5
1983[r]	18,497	10,774	1,139	6.2	10.6
1984	19,590	11,635	1,200	6.1	10.3

Source: Manufacturing and Durable Goods Employment from Bureau of Labor Statistics, "Employment and Earnings" (Monthly); Aerospace Employment from Aerospace Industries Association estimates based on "Employment and Earnings," Bureau of Labor Statistics.

NOTE: For explanation of "Aerospace Employment," see the Glossary.

[r] Revised.

ANNUAL PAYROLL
AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1961-1982*
(Millions of Dollars)

Year	All Manufacturing Industries[b]	Aerospace[a]			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other	
1961	$ 89,800	$ 9,140	$ 4,342	$ 4,798	10.2%
1962	96,700	10,232	4,871	5,361	10.6
1963	100,600	10,173	4,588	5,585	10.1
1964	107,100	10,067	4,563	5,504	9.4
1965	115,500	10,188	4,504	5,684	8.8
1966	128,000	12,139	5,641	6,498	9.5
1967	134,100	13,727	6,382	7,345	10.2
1968	145,800	14,397	6,582	7,815	9.9
1969	157,500	14,649	6,401	8,248	9.3
1970	158,200	12,275	5,322	6,953	7.8
1971	160,300	10,480	4,409	6,071	6.5
1972	175,400	10,504	4,280	6,224	6.0
1973	196,200	12,107	5,087	7,020	6.2
1974	211,400	13,535	5,672	7,863	6.4
1975	211,000	14,608	5,935	8,673	6.9
1976	237,400	14,881	5,951	8,930	6.3
1977	266,000	16,276	6,464	9,812	6.1
1978	299,200	19,501	7,873	11,628	6.5
1979	333,900	24,243	10,247	13,996	7.3
1980	354,600[r]	28,738	12,087	16,651	8.1
1981	385,300	31,937	13,018	18,919	8.3
1982*	383,800	33,747	13,036	20,711	8.8

Source: Manufacturing Payroll from Bureau of Economic Analysis, "Survey of Current Business;" Aerospace Payroll from Aerospace Industries Association estimates.

[a] Based on AIA estimates of annual average employment and earnings for the aerospace industry; derived from BLS data (see Glossary, "Aerospace Employment" and "Aerospace Payroll").

[b] See Glossary, "Payroll, All Manufacturing."

[r] Revised.

* Annual data not available since 1982, pending resolution of BLS reporting methodology to include prorations of Lump Sum Wage Payments which many aerospace manufacturers have included in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments.

EMPLOYMENT IN THE AEROSPACE INDUSTRY[a]

Calendar Years 1968-1984
(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft, Engines, & Parts (SIC 372)	Missiles & Space Vehicles (SIC 376)	Avionics[b]	Other
TOTAL EMPLOYMENT					
1968[c]	1,502	852	150	184	316
1969	1,402	804	124	179	295
1970	1,166	669	98	152	247
1971	951	531	88	129	203
1972	912	495	93	113	211
1973	956	525	93	116	222
1974	982	539	94	121	228
1975	941	514	93	116	218
1976	896	487	86	115	208
1977	893	482	83	121	207
1978	977	527	93	129	228
1979	1,109	611	102	139	257
1980	1,185	652	111	147	275
1981	1,201	646	123	154	278
1982[r]	1,158	601	131	157	269
1983[r]	1,139	579	140	156	264
1984	1,200	602	153	167	278
PRODUCTION WORKERS					
1968[c]	807	506	52	80	169
1969	746	464	41	86	155
1970	604	369	31	77	127
1971	480	285	26	66	103
1972	455	266	28	55	106
1973	482	284	29	57	112
1974	494	292	29	59	114
1975	461	271	29	54	107
1976	433	251	28	54	100
1977	429	247	26	56	100
1978	476	275	29	61	111
1979	562	332	33	67	130
1980	598	355	35	70	137
1981	590	343	37	74	136
1982[r]	544	305	40	72	127
1983[r]	518	282	45	70	121
1984	539	288	51	74	126

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] See Glossary for detailed explanation of "Aerospace Employment."

[b] Communications, navigation, flight control, and displays (aerospace-related portions of SICs 3662, 381, & 382).

[c] Aerospace industry employment peak.

[r] Revised.

EMPLOYMENT IN THE AIRCRAFT, ENGINES, AND PARTS INDUSTRY[a]

Calendar Years 1968-1984
(Annual Average, Thousands of Employees)

Year	TOTAL (SIC 372)	Airframes (SIC 3721)	Engines and Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)
TOTAL EMPLOYMENT				
1968[b]	852.0	468.2	216.4	147.8
1969	804.4	456.7	205.0	142.7
1970	668.7	369.6	179.9	119.2
1971	530.8	287.7	150.6	92.6
1972	494.9	287.2	124.0	83.6
1973	524.9	300.5	132.6	91.8
1974	539.4	307.6	134.6	97.1
1975	514.0	292.8	126.3	94.9
1976	487.1	281.1	119.7	86.3
1977	481.7	270.4	120.9	90.4
1978	527.2	288.3	133.5	105.5
1979	610.8	333.2	151.6	126.1
1980	652.3	349.3	162.9	140.1
1981	645.5	344.2	162.5	138.8
1982[r]	601.1	319.9	148.8	132.3
1983[r]	578.5	306.7	141.3	130.6
1984	601.5	319.4	144.5	137.5
PRODUCTION WORKERS				
1968[b]	505.5	280.9	123.9	100.7
1969	464.0	255.1	114.1	94.8
1970	369.3	197.0	95.0	77.3
1971	284.5	147.1	79.0	58.4
1972	266.2	145.1	68.6	52.5
1973	284.2	151.5	74.2	58.5
1974	291.9	154.4	75.2	62.3
1975	271.1	140.9	70.5	59.7
1976	250.7	132.2	65.6	53.0
1977	246.8	124.4	66.6	55.8
1978	275.4	133.9	75.3	66.2
1979	332.1	165.9	86.4	79.8
1980	354.6	173.7	93.0	88.0
1981	343.0	167.0	92.4	83.6
1982[r]	305.4	144.7	84.2	76.6
1983[r]	282.4	132.4	75.4	74.7
1984	287.9	133.8	75.2	78.9

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).
NOTE: Detail may not add to totals because of rounding.

[a] See Glossary for detailed explanation of "Aerospace Employment."

[b] Aerospace industry employment peak.

[r] Revised

AEROSPACE INDUSTRY EMPLOYMENT BY OCCUPATIONAL CLASSIFICATION

As of December 1968-1985
(Thousands of Employees)

Year	TOTAL[a]	Production Workers	Scientists & Engineers	Technicians	Others
1968	1,403	738	221	81	363
1969	1,295	658	203	72	362
1970	1,069	528	167	67	307
1971	924	448	159	60	257
1972	944	473	168	65	238
1973	962	484	164	66	248
1974	973	483	166	67	257
1975	925	444	167	63	251
1976	898	420	166	62	250
1977[b]	894	410	173	59	252
1978	1,032	519	170	64	279
1979	1,152	592	177	69	314
1980	1,218	612	196	78	332
1981	1,203	578	194	84	347
1982	1,153	535	200	79	339
1983[b]	1,171	528	207	87	349
1984	1,252	567	223	93	369
1985[E]	1,299	584	234	98	383

Source: Aerospace Industries Association, based on company reports and data from the Bureau of Labor Statistics.

[a] End-of-year totals differ from annual averages appearing in other tables.

[b] Industry strike during this period.

[E] Estimate.

AEROSPACE INDUSTRY EMPLOYMENT BY OCCUPATIONAL CLASSIFICATION AND PRODUCT GROUP

As of December 1977-1985
(Thousands of Employees)

Year	TOTAL[a]	Production Workers	Scientists & Engineers	Technicians	All Others
AIRCRAFT AND PARTS					
1977[b]	482	263	78	23	118
1978	555	330	71	26	128
1979	654	397	76	28	153
1980	691	414	83	35	159
1981	641	377	77	38	149
1982	596	335	79	29	153
1983[b]	582	312	81	29	160
1984	625	340	88	30	167
1985[E]	650	355	91	32	172
MISSILES AND SPACE VEHICLES AND PARTS					
1977[b]	191	65	61	14	61
1978	214	79	51	15	69
1979	220	82	51	15	72
1980	233	84	56	16	77
1981	262	96	59	19	88
1982	238	88	55	19	76
1983[b]	283	106	64	25	88
1984	306	114	69	28	95
1985[E]	313	112	72	30	99
OTHER RELATED PRODUCTS AND SERVICES					
1977[b]	221	82	44	22	73
1978	263	110	48	23	82
1979	278	113	50	26	89
1980	294	114	57	27	96
1981	300	105	58	27	110
1982	319	112	66	31	110
1983[b]	306	110	62	33	101
1984	321	114	66	34	107
1985[E]	336	116	71	37	112

Source: Aerospace Industries Association, based on company reports and data from the Bureau of Labor Statistics.

[a] End-of-year totals differ from annual averages appearing in other tables. Product group totals are based on AIA surveys, and include some component-related employment which is reported under separate SIC codes in BLS data.

[b] Industry strike during this period.

[E] Estimate.

GEOGRAPHIC DISTRIBUTION OF AEROSPACE EMPLOYMENT[a] BY OCCUPATIONAL CLASSIFICATION AND PRODUCT GROUP

As of December 1984

OCCUPATIONAL CLASSIFICATION

Region	TOTAL	Production Workers	Scientists & Engineers	Technicians	All Others
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%
New England	12.7%	16.7%	8.8%	10.2%	11.3%
Middle Atlantic	15.0	14.1	15.2	10.6	17.0
East North Central	2.1	2.5	2.3	1.7	1.8
West North Central	9.6	10.2	9.5	7.3	9.5
South Atlantic	8.9	6.8	7.6	9.8	11.6
South Central	6.4	7.4	5.7	4.5	6.4
Mountain	4.1	4.6	3.5	6.6	3.1
Pacific	41.2	37.7	47.4	49.3	39.3

PRODUCT GROUP

Region	Aircraft		Missiles	Space	Other	
	Civil	Military			Aerospace	Non-Aerospace
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100%
New England	14.2%	10.3%	20.2%	19.7%	18.7%	7.5%
Middle Atlantic	23.8	18.4	5.5		5.1	12.9
East North Central	1.8	3.0	8.1	0.8	5.0	10.4
West North Central	8.5	15.4			6.8	
South Atlantic	3.5	10.3	8.3	7.4	15.9	7.0
South Central	4.3	12.0	2.3	4.9	3.2	7.1
Mountain	6.7	1.8	10.2	1.1	45.3	5.8
Pacific	37.2	28.8	45.4	66.1		49.3

Source: Aerospace Industries Association, company reports.

NOTE: Data for two regions are combined where employment for one region within a product group represented three or fewer companies.

[a] Employment in 40 surveyed aerospace manufacturing companies representing approximately two-thirds of total industry employment.

TOTAL EMPLOYMENT AND SCIENTISTS & ENGINEERS IN COMMERCIAL TRANSPORT AIRCRAFT & HELICOPTER MANUFACTURING ESTABLISHMENTS

As of December 1968-1985

Year	Commercial Transport Aircraft		Helicopters	
	Total	Scientists & Engineers	Total	Scientists & Engineers
1968	126,200	14,500	39,000	4,000
1969	114,200	15,800	30,600	3,200
1970	82,500	12,300	26,000	2,700
1971	72,000	9,400	21,700	3,000
1972	77,300	9,500	20,700	3,300
1973	75,700	9,300	22,100	3,100
1974	63,600	8,100	24,600	3,300
1975	51,100	7,400	25,800	3,100
1976	44,700	6,700	23,200	2,900
1977[a]	55,900	8,100	22,300	3,700
1978	70,100	10,400	26,600	3,600
1979	100,000	12,900	27,500	3,000
1980	106,500	13,700	29,800	3,200
1981	84,000	12,000	28,000	3,000
1982	69,800	11,100	28,300	3,200
1983[a]	48,200	8,400	27,600	3,500
1984	56,300	9,800	31,300	3,900
1985[E]	57,800	10,200	33,200	4,100

Source: Aerospace Industries Association, company reports.
NOTE: Includes only establishments identified as prime manufacturers of commercial transport aircraft and of civil and military helicopters. Excludes subcontractors and propulsion manufacturers.
E Estimate.
a Industry strike during this period.
r Revised.

AVERAGE EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982*

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	
AVERAGE HOURLY EARNINGS[b]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.99	4.99	5.09	5.04	4.70	5.02
1974	5.43	5.42	5.58	5.41	5.05	5.48
1975	6.00	6.00	6.21	6.04	5.47	6.02
1976	6.44	6.44	6.63	6.46	5.95	6.48
1977	6.93	6.92	7.07	7.05	6.44	7.04
1978	7.54	7.54	7.70	7.80	6.93	7.56
1979	8.26	8.26	8.50	8.53	7.48	8.25
1980	9.27	9.28	9.66	9.42	8.40	9.22
1981	10.29	10.31	10.74	10.41	9.35	10.06
1982*	11.20	11.23	11.85	11.16	10.17[r]	10.95[r]
AVERAGE WEEKLY EARNINGS[b]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	202.95	202.10	199.53	209.66	199.75	211.34
1974	221.10	220.59	222.08	221.81	213.62	226.32
1975	247.53	247.80	255.85	247.04	228.65	245.01
1976	263.31	263.40	273.16	259.69	245.74	262.44
1977	289.76	289.95	296.23	291.87	273.70	287.94
1978	318.05	318.19	324.17	325.26	298.68	316.76
1979	350.64	351.05	359.55	360.82	322.39	346.50
1980	388.71	389.76	403.79	393.76	357.84	378.02
1981	424.31	425.80	443.56	421.61	396.44	410.45
1982*	459.84[r]	461.55	484.67	454.21	426.12[r]	446.76[r]

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

[b] Includes overtime premiums.

[r] Revised.

* Average annual data not available since 1982, pending resolution of BLS reporting methodology to include prorations of Lump Sum Wage Payments which many aerospace manufacturers have included in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments.

AVERAGE EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982*

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	
AVERAGE HOURLY EARNINGS[c] IN CONSTANT DOLLARS (1972 = 100)[a]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.70	4.70	4.79	4.75	4.43	4.73
1974	4.61	4.60	4.73	4.59	4.28	4.65
1975	4.66	4.66	4.83	4.69	4.25	4.68
1976	4.73	4.73	4.87	4.75	4.37	4.76
1977	4.78	4.78	4.88	4.87	4.44	4.86
1978	4.84	4.84	4.94	5.00	4.45	4.85
1979	4.76	4.76	4.90	4.92	4.31	4.76
1980	4.71	4.71	4.90	4.78	4.26	4.68
1981	4.73	4.74	4.94	4.79	4.30	4.63
1982*	4.85	4.87	5.14	4.84	4.41	4.75
AVERAGE WEEKLY EARNINGS[c] IN CONSTANT DOLLARS (1972 = 100)[a]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	191.10	190.30	187.88	197.42	188.09	199.00
1974	187.53	187.10	188.36	188.13	181.19	191.96
1975	192.33	192.54	198.80	191.95	177.66	190.37
1976	193.47	193.53	200.71	190.81	180.56	192.83
1977	199.97	200.10	204.44	201.43	188.89	198.72
1978	204.01	204.10	207.93	208.63	191.58	203.18
1979	202.10	202.33	207.23	207.97	185.82	199.71
1980	197.31	197.85	204.97	199.88	181.64	191.89
1981	195.17	195.86	204.03	193.93	182.36	188.80
1982*	199.32[r]	200.07	210.09	196.88	184.71[r]	193.65[r]

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] Based on Consumer Price Index (CPI), published by the Bureau of Labor Statistics with 1967 base year, converted to 1972 base year by AIA.

[b] TOTAL column is a weighted average based on BLS employment data.

[c] Includes overtime premiums.

[r] Revised.

* Average annual data not available since 1982, pending resolution of BLS reporting methodology to include prorations of Lump Sum Wage Payments which many aerospace manufacturers have included in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments.

AVERAGE HOURS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982*

AVERAGE WEEKLY HOURS

Year	TOTAL[a]	Aircraft (SIC 372)				Guided Missiles, Space Vehicles & Parts (SIC 376)
		TOTAL	Airframes (SIC 3721)	Engines & Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)	
1972	40.2	40.0	38.9	40.9	42.2	41.9
1973	40.6	40.5	39.2	41.6	42.5	42.1
1974	40.8	40.7	39.8	41.0	42.3	41.3
1975	41.2	41.3	41.2	40.9	41.8	40.7
1976	40.9	40.9	41.2	40.2	41.3	40.5
1977	41.8	41.9	41.9	41.4	42.5	40.9
1978	42.2	42.2	42.1	41.7	43.1	41.9
1979	42.5	42.5	42.3	42.3	43.1	42.0
1980	41.9	42.0	41.8	41.8	42.6	41.0
1981	41.3	41.3	41.3	40.5	42.4	40.8
1982*	41.1	41.1	40.9	40.7	41.9	40.8[r]

AVERAGE WEEKLY OVERTIME HOURS

Year	TOTAL[a]	Aircraft, Engines, and Parts	Guided Missiles, Space Vehicles, and Parts
1972	3.0	3.0	2.6
1973	3.2	3.3	2.7
1974	3.3	3.3	3.0
1975	3.0	3.0	3.3
1976	2.7	2.7	2.7
1977	3.5	3.5	3.2
1978	4.4	4.4	4.1
1979	4.7	4.7	4.4
1980	4.1	4.2	3.6
1981	3.5	3.5	3.2
1982*	3.2	3.2	3.1

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

[r] Revised

* Average annual data not available since 1982 pending resolution of BLS reporting methodology to include prorations of Lump Sum Wage Payments which many aerospace manufacturers have included in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments.

OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES[a] ALL MANUFACTURING AND AEROSPACE INDUSTRIES

Calendar Years 1979-1983

	1979	1980	1981	1982	1983
All Manufacturing:					
Total Cases	13.3	12.2	11.5	10.2	10.0
Lost Workday Cases	5.9	5.4	5.1	4.4	4.3
Nonfatal Cases without Lost Workdays	7.4	6.8	6.4	5.8	5.7
Lost Workdays	90.2	86.7	82.0	75.0	73.5
Aircraft and Parts (SIC 372):					
Total Cases	7.1	6.8	6.2	6.0	5.2
Lost Workday Cases	3.0	2.9	2.6	2.3	2.0
Nonfatal Cases without Lost Workdays	4.1	3.8	3.6	3.6	3.2
Lost Workdays	49.1	46.9	41.7	36.9	34.3
Aircraft (SIC 3721):					
Total Cases	5.2	4.8	4.8	4.8	4.0
Lost Workday Cases	2.4	2.0	1.8	1.7	1.4
Nonfatal Cases without Lost Workdays	2.8	2.8	2.9	3.1	2.5
Lost Workdays	44.0	35.1	29.7	29.5	25.4
Aircraft Engines and Parts (SIC 3724):					
Total Cases	8.0	7.8	6.6	6.6	4.8
Lost Workday Cases	3.5	4.0	3.6	3.3	2.6
Nonfatal Cases without Lost Workdays	4.5	3.7	3.0	3.3	2.2
Lost Workdays	55.0	68.3	64.7	51.5	47.6
Aircraft Parts (SIC 3728):					
Total Cases	10.9	10.6	9.4	8.1	8.5
Lost Workday Cases	4.0	3.9	3.4	2.8	2.7
Nonfatal Cases without Lost Workdays	6.9	6.7	6.0	5.3	5.8
Lost Workdays	55.8	53.4	45.1	39.1	40.7
Guided Missiles, Space Vehicles & Parts SIC 376):					
Total Cases	3.1	3.1	2.6	2.7	2.4
Lost Workday Cases	1.4	1.4	1.2	1.2	1.2
Nonfatal Cases without Lost Workdays	1.7	1.7	1.4	1.5	1.3
Lost Workdays	20.8	21.9	19.2	19.1	20.1
Guided Missiles & Space Vehicles (SIC 3761):					
Total Cases	2.7	2.9	2.1	2.1	2.2
Lost Workday Cases	1.3	1.3	1.0	0.9	1.1
Nonfatal Cases without Lost Workdays	1.4	1.6	1.0	1.2	1.0
Lost Workdays	19.9	20.9	17.3	16.3	19.9
Space Propulsion Units & Parts (SIC 3764):					
Total Cases	4.2	3.5	4.1	3.9	3.0
Lost Workday Cases	1.8	1.8	1.9	1.9	1.3
Nonfatal Cases without Lost Workdays	2.4	1.7	2.2	1.9	1.7
Lost Workdays	25.5	23.8	25.7	28.7	20.6
Other Space Vehicle Equipment (SIC 3769):					
Total Cases	5.1	4.2	4.6	5.4	3.2
Lost Workday Cases	1.4	2.1	1.7	1.6	1.1
Nonfatal Cases without Lost Workdays	3.7	2.1	2.9	3.8	2.1
Lost Workdays	20.9	28.2	23.0	26.7	20.1

Source: Department of Labor, Bureau of Labor Statistics, "Occupational Injuries and Illnesses" (Annually).

[a] Defined as the number of injuries and illnesses per 100 full-time workers. Separate incidence rates also available for occupational injuries only.

FEDERAL CIVILIAN EMPLOYMENT[a] IN THE DEPARTMENT OF DEFENSE

Fiscal Years 1964-1986

Year	TOTAL	Civil Functions[b]	Military Functions[c]
1964	1,029,756	31,893	997,863
1965	1,004,570	29,902	974,668
1966	1,083,288	30,290	1,052,998
1967	1,225,637	31,980	1,193,657
1968	1,288,130	32,062	1,256,068
1969	1,257,091	31,214	1,225,877
1970	1,159,935	30,293	1,129,642
1971	1,092,804	30,063	1,062,741
1972	1,040,147	30,585	1,009,562
1973	987,281	29,971	957,310
1974	1,002,850	29,072	973,778
1975	983,790	29,069	954,721
1976	951,034	28,648	922,386
1977	940,549	28,912	911,637
1978	933,071	28,962	904,109
1979	914,582	28,592	885,990
1980	907,700	27,700	880,000
1981	981,400	34,400	947,000
1982	1,009,344	31,263	978,081
1983	1,015,779	30,973	984,806
1984	1,040,213	28,681	1,011,532
1985[E]	1,039,015	28,798	1,010,217
1986[E]	1,048,869	28,548	1,020,321

Source: "The Budget of the United States Government" (Annually).

[a] Full-time equivalent civilian employment.

[b] Data are estimated for portions of Civil Functions.

[c] Section 904 of the 1982 Defense Authorization Act (Public Law 97-86) exempts the Department of Defense from full-time equivalent controls. Data shown are estimated civilian employment for military functions and military assistance.

[E] Estimate.

EMPLOYMENT IN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

End of Fiscal Years 1960-1986

Year	TOTAL	NASA Employees	Contractor Employees[a]
1960	46,768	10,268	36,500
1961	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982	127,952	21,652	106,300
1983	129,246	22,246	107,000
1984	162,080	22,080	140,000
1985[E]	155,000	22,000	133,000
1986[E]	154,800	21,800	133,000

Source: NASA Briefing on the Budget of the United States (Annually), and NASA Headquarters.

[a] Includes estimates of manpower for hardware and related contracts, as well as actual work-years for support service contracts. Increase in FY 1984 caused by change in estimating methodology to reflect more accurately the mix of support and development contractors.

[E] Estimate.

EMPLOYMENT AND COST OF R&D SCIENTISTS AND ENGINEERS ALL INDUSTRIES AND AEROSPACE INDUSTRY

1972-1984

Year	Employment[a]			Cost per R&D Scientist and Engineer[d]	
	All Industries[b] (Thousands)	Aerospace[c] (Thousands)	Aerospace as a Percent of All Industries	All Industries[b]	Aerospace[c]
1972	350.2	70.8	20.2%	$ 55,300	$ 69,200
1973	357.7	72.1	20.2	59,200	70,800
1974	360.0	70.6	19.6	63,300	76,400
1975	363.3	67.5	18.6	66,500	85,100
1976	364.4	66.9	18.4	72,200	91,300
1977	382.8	72.0	18.8	75,800	91,300
1978	404.4	82.0	20.3	80,400	89,400
1979	423.9	86.5	20.4	87,400	93,300
1980	450.6	85.9	19.1	94,900	101,600
1981	487.8	95.2	19.5	103,900	128,400
1982	509.8	91.1	17.9	112,400[r]	146,400[r]
1983[r]	522.1	95.5	18.3	118,500	142,400
1984	537.8	97.5	18.1	NA	NA

Source: National Science Foundation.

[a] Employment as of January. Scientists and engineers working less than full time have been included in terms of their full time equivalent number.

[b] All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.

[c] SIC codes 372 and 376.

[d] The arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years, divided into the total R&D expenditures of each industry during the earlier year.

NA Not available.

AEROSPACE INDUSTRY WORK STOPPAGES[a]

Calendar Years 1967-1984

Year[b]	Number of Strikes[c]	Number of Workers Involved	Work-Days Idle in Year	Year[b]	Number of Strikes[c]	Number of Workers Involved	Work-Days Idle in Year
1967	22	28,800	160,800	1976	21	13,000	330,500
1968	46	45,500	594,300	1977	21	46,700	1,832,200
1969	26	76,400	1,564,600	1978	17	13,700	741,200
1970	12	6,800	552,500	1979	12	6,600	103,400
1971	24	17,200	465,500	1980	17	4,400	92,900
1972	18	2,800	148,100	1981	12	6,100	188,900
1973	13	4,500	99,100	1982	4	11,900	45,200
1974	27	16,800	370,000	1983	2	8,700	404,100
1975	20	22,800	1,245,600	1984	4	14,600	188,200

Source: Department of Labor, Bureau of Labor Statistics, Division of Wages and Industry Relations.

[a] Based on SIC 372 of the 1967 Code, which includes missile and space propulsion units and parts and missile and space vehicle equipment not elsewhere classified, but which excludes complete guided missiles and space vehicles.

[b] Effective 1982, data not available for work stoppages involving fewer than 1,000 employees.

[c] Strikes beginning during calendar year.

FINANCE

In 1984, the aerospace industry recorded a net profit after taxes of $3.6 billion. The figure compares with $2.8 billion in 1983 and the previous all-time high of $3 billion in 1981.

Expressed as a percentage of sales, the profit rate was 4.1 percent, up from 3.5 percent in 1983 and slighly above the 3.9 percent average for the first five years of the 1980s. The aerospace profit increase was consistent with the U.S. manufacturers in general, whose average profit rose as the national economy continued to improve. The 1984 aerospace rate compares with an average of 4.6 percent for all U.S. manufacturing corporations and 4.4 percent for manufacturers of durable goods.

Measured as a percentage of assets, the aerospace rate was 4.7 percent, up from 4.1 percent in 1983; the average for all manufacturing corporations was 5.9 percent. As a percentage of equity, the aerospace profit amounted to 14.1 percent, up from 12.2 percent in 1984; the all-manufacturing average in 1984 was 12.4 percent.

Aerospace expenditures for new plant and equipment amounted to $3.6 billion in 1984. This figure represents a substantial decrease from previously reported levels for the aerospace industry, reflecting revision to the data series by the Bureau of Economic Analysis of the Department of Commerce to incorporate benchmarks, retabulations of previous survey data, definitional changes, and recalculations of seasonal factors, bias adjustment factors, and price deflators. An estimate of aerospace plant and equipment outlays in 1985 is also lower than previously reported, indicating a 6.8 percent increase over 1984.

The aerospace balance sheet for 1984 showed an increase over 1983 in total assets—up $9.4 billion—and in total stockholders' equity—up $1.8 billion to $26.2 billion. Net working capital dipped to $9.5 billion, down from $9.7 billion in 1983.

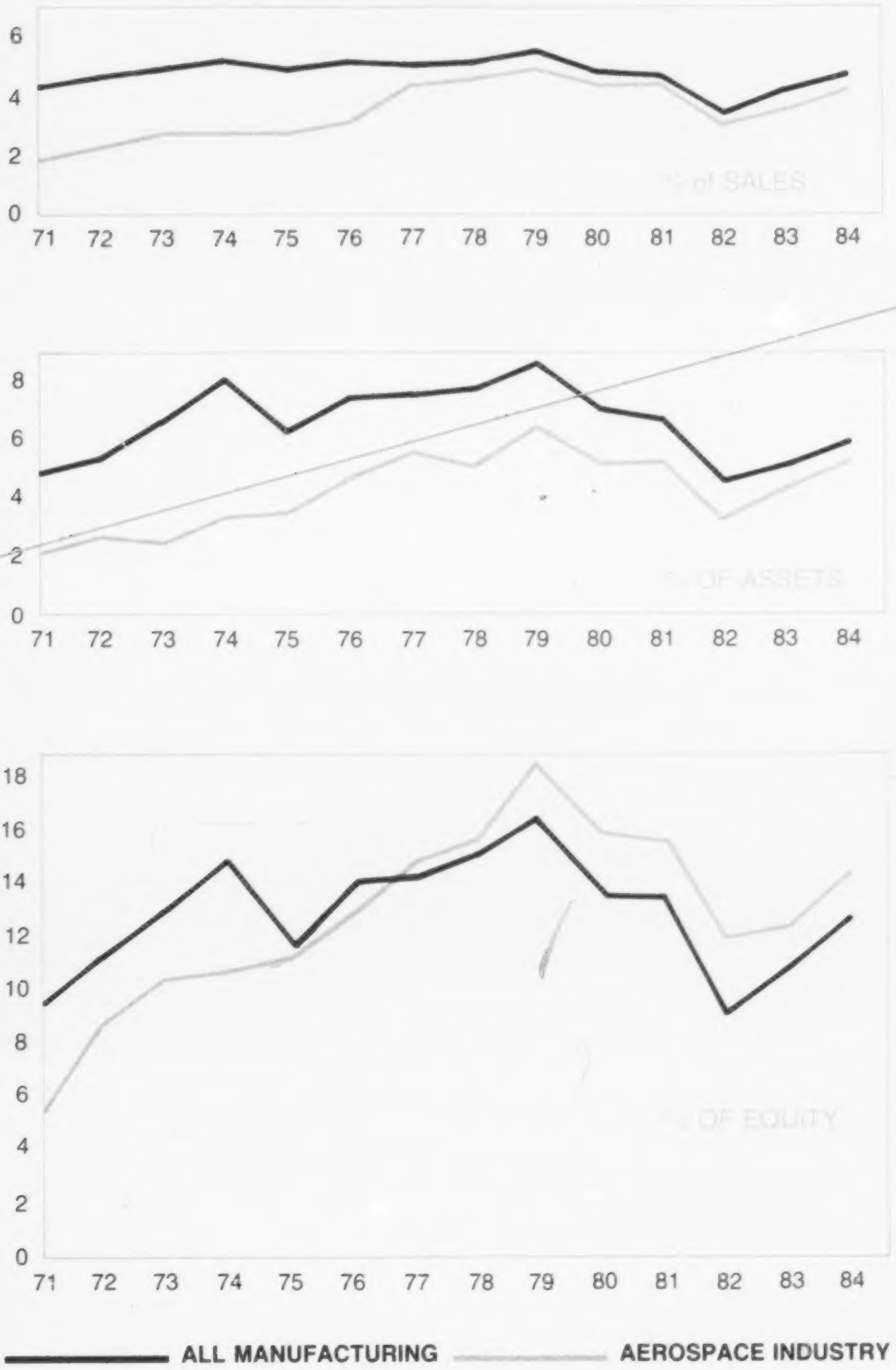
In terms of contract dollar value, McDonnell Douglas Corporation moved to the top of the list of companies awarded Department of Defense contracts in Fiscal Year 1984. McDonnell Douglas received contracts valued at $7.7 billion; the company had placed second in the previous year. Rockwell International Corporation, third in 1983, climbed to second place with awards totaling $6.2 billion. Third, at $6 billion, was General Dynamics Corporation, the 1983 leader. Rounding out the top 10 for 1984 were Lockheed Corporation ($5 billion); The Boeing Company ($4.6 billion); General Electric Company ($4.5 billion); Hughes Aircraft Company ($3.2 billion); United Technologies (3.2 billion); Raytheon Company ($3.1 billion); and Litton Industries Inc. ($2.4 billion). With the exception of Litton, 12th in 1983, all were in the top 10 in the preceding year.

A Department of Defense analysis of FY 1984 military hard goods contract awards by geographic region showed the Pacific region a repeat leader in all three aerospace categories: aircraft, missile/space systems, and electronics/communications equipment. The Pacific region led in aircraft-related contracts with awards totaling $8.3 billion, 26.1 percent of the total. In second place, as in the previous year, was the West North Central region ($6 billion, 17.6 percent). The New England region again placed third ($4.3 billion, 13.6 percent).

In missiles/space, Pacific received contracts worth $8.2 billion, 44.6 percent of the total, far ahead of second place New England ($2.8 billion, 15.2 percent). The South Atlantic region was third with $1.9 billion, 10.4 percent. In electronics communications, Pacific led with $5.8 billion, 27 percent, followed by Middle Atlantic ($4.5 billion, 21.1 percent) and South Atlantic ($4.1 billion, 19.4 percent).

Perennial leader Rockwell International was again first among NASA prime contractors in FY 1984 with awards totaling $1.4 billion. Martin Marietta Corporation was again second ($428 million) and Morton Thiokol, Inc. third ($322 million). The three leaders are the principal producers of Space Shuttle components; the fourth place firm—Lockheed Space Operations Company, $301 million—handles management of Shuttle ground operations. The rest of the NASA top 10 included General Dynamics Corporation, $253 million; McDonnell Douglas Corporation, $200 million; United Space Boosters, Inc., $197 million; Bendix (Allied Corporation), $163 million, IBM Corporation, $134 million; and United Technologies Corporation, $118 million.

NET PROFIT AFTER TAXES



Source: Aerospace Industries Association

NET PROFIT AFTER TAXES AS A PERCENT OF SALES, ASSETS, AND EQUITY FOR ALL MANUFACTURING CORPORATIONS AND THE AEROSPACE INDUSTRY[a]

Calendar Years 1971-1984

PERCENT OF SALES

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace Industry
1971	4.1%	4.5%	3.8%	1.8%
1972	4.4	4.6	4.3	2.4
1973	4.7	5.0	4.5	2.9
1974	5.5	6.4	4.7	2.9
1975	4.6	5.1	4.1	2.9
1976	5.4	5.5	5.2	3.4
1977	5.3	5.3	5.3	4.2
1978	5.4	5.4	5.5	4.4
1979	5.7	6.1	5.2	5.0
1980	4.8	5.6	4.0	4.3
1981	4.7	5.1	4.3	4.4
1982	3.5	4.6	2.4	3.3
1983	4.1	4.9	3.1	3.5[r]
1984	4.6	4.8	4.4	4.1

PERCENT OF ASSETS[b] AND EQUITY[b]

Year	Percent of Assets		Percent of Equity	
	All Manufacturing	Aerospace Industry	All Manufacturing	Aerospace Industry
1971	5.1%	2.0%	9.7%	5.8%
1972	5.5	2.7	11.1	8.6
1973	6.5	2.4	12.8	10.3
1974	8.0	3.7	14.9	10.4
1975	6.2	3.8	11.6	11.0
1976	7.5	4.7	14.0	12.8
1977	7.6	5.7	14.2	14.9
1978	7.8	5.5	15.0	15.7
1979	8.4	6.3	16.5	18.4
1980	6.9	5.2	13.9	16.0
1981	6.7	5.2	13.6	15.9
1982	4.5	3.7	9.2	12.0
1983	5.2	4.1[r]	10.6	12.2[r]
1984	5.9	4.7	12.4	14.1

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

[a] Based on a sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and propulsion and parts.

[b] Average of four quarters.

[r] Revised.

INCOME STATEMENT AND OPERATING RATIOS FOR AEROSPACE COMPANIES[a]

Calendar Years 1981-1984
(Millions of Dollars)

INCOME STATEMENT	1981	1982	1983[r]	1984
Net Sales, Receipts, Operating Revenues	$67,519	$66,198	$81,441	$87,686
Less: Depreciation, Depletion & Amortization of Property, Plant and Equipment	1,466	1,689	2,203	2,479
Less: All Other Operating Costs & Expenses, Including Selling Costs & General & Administrative Expenses	62,299	61,421	75,044	79,721
Income (or Loss) from Operations	$ 3,754	$ 3,090	$ 4,193	$ 5,486
Net Non-Operating Income (Expense)	911	183	429	19
Income (or Loss) before Income Taxes (= Total Income)	$ 4,665	$ 3,272	$ 4,622	$ 5,504
Less: Provision for Current & Deferred Domestic Income Taxes	1,699	1,081	1,791	1,922
Income (or Loss) after Income Taxes (= Net Profit)	$ 2,966	$ 2,193	$ 2,829	$ 3,582
Cash Dividends Charged to Retained Earnings	897	841	985	1,102
Net Income Retained in Business	$ 2,068	$ 1,350	$ 1,845	$ 2,481
Retained Earnings at Beginning of Year[b]	11,915	12,508	15,479	17,352
Adjustments to Retained Earnings[c]	(423)	(160)	75	38
Retained Earnings at End of Year[d]	$13,561	$13,700	$17,398	$19,870

OPERATING RATIOS				
Income before Taxes as Percent of Net Sales	6.9%	4.9%	5.7%	6.3%
Provision for Current & Deferred Domestic Income Taxes as Percent of Income before Taxes (Total Income)	36.4	33.0	38.7	34.9
Income after Taxes (Net Profit) as Percent of Net Sales	4.4	3.3	3.5	4.1
Income after Taxes (Net Profit) as Percent of Stockholders' Equity[e]	15.9	12.0	12.2	14.1
Income after Taxes (Net Profit) as Percent of Total Assets[e]	5.2	3.7	4.1	4.7

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations."

NOTE: Detail may not add to totals because of rounding.

[a] Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and propulsion and parts.

[b] Beginning-of-year retained earnings for any particular year do not equal end-of-year retained earnings for the previous year because of rotation of small companies in survey sample.

[c] Other direct credits (or charges) to retained earnings (net), including stock and other non-cash dividends, etc.

[d] Retained Earnings at End of Year CALCULATED AS Retained Earnings at Beginning of Year PLUS Income (Loss) after Income Taxes MINUS Cash Dividends Charged to Retained Earnings PLUS Adjustments to Retained Earnings.

[r] During the first quarter of 1984, a considerable number of companies were reclassified by industry. To provide comparability, data for 1983 have been restated to reflect these reclassifications.

[e] Average of four quarters.

BALANCE SHEET FOR AEROSPACE COMPANIES[a]

December 31, 1980-1984
(Millions of Dollars)

	1980	1981	1982	1983[r]	1984
Assets:					
Current Assets					
Cash	$ 562	$ 1,056	$ 891	$ 2,070	$ 2,168
Securities, Com'l Paper & Other Short-term Financial Investments	2,250	2,876	1,317	2,716	2,844
Total Cash and U.S. Gov't and Other Securities	$ 2,812	$ 3,932	$ 2,208	$ 4,786	$ 5,012
Receivables (Total)	5,991	5,979	6,305	8,661	10,020
Inventories (Gross)	26,497	30,011	31,006	31,716	37,429
Other Current Assets	834	870	639	821	1,209
Total Current Assets	$36,135	$40,792	$40,159	$45,983	$53,670
Net Plant, Property & Equipment	9,368	10,952	12,229	14,613	15,619
Other Non-Current Assets	6,935	7,445	7,041	9,421	10,123
Total Assets	$52,437	$59,190	$59,428	$70,017	$79,412
Liabilities:					
Current Liabilities					
Short Term Loans	$ 1,198	$ 1,702	$ 1,174	$ 899	$ 1,680
Trade Accts. & Notes Payable	5,095	5,213	5,859	5,884	6,629
Income Taxes Accrued	2,769	2,538	2,771	3,426	4,399
Installments Due on Long Term Debts	178	279	344	421	607
Other Current Liabilities	19,589	22,092	22,157	25,633	30,872
Total Current Liabilities	$28,830	$31,825	$32,307	$36,264	$44,187
Long Term Debt	4,525	5,383	5,822	5,206	4,768
Other Non-Current Liabilities	2,123	2,930	2,896	4,157	4,298
Total Liabilities	$35,478	$40,137	$41,025	$45,627	$53,253
Stockholders' Equity:					
Capital Stock	$ 5,072	$ 5,491	$ 4,704	$ 6,993	$ 6,289
Retained Earnings	11,888	13,561	13,700	17,398	19,870
Total Stockholders' Equity	$16,959	$19,053	$18,404	$24,391	$26,158
Total Liabilities & Stockholders' Equity	$52,437	$59,190	$59,428	$70,017	$79,412
Net Working Capital	$ 7,304	$ 8,967	$ 7,852	$ 9,719	$ 9,483

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Detail may not add to totals because of rounding.

[a] Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and propulsion and parts.

[r] During the first quarter of 1984, a considerable number of companies were reclassified by industry. To provide comparability, the data for 1983 have been restated to reflect these reclassifications.

NEW PLANT AND EQUIPMENT EXPENDITURES[r]

Calendar Years 1960-1985
(Billions of Dollars)

Year	All Industries	All Manufacturing Industries	Durable Goods	Aerospace[a]	
				Current Dollars	Constant Dollars 1972 = 100[b]
1960	$ 39.44	$ 16.36	$ 8.28	$0.34	$0.48
1961	38.34	15.53	7.43	0.30	0.43
1962	40.86	16.03	7.81	0.40	0.55
1963	43.67	17.27	8.64	0.44	0.60
1964	51.26	21.23	10.98	0.41	0.56
1965	59.52	25.41	13.49	0.53	0.71
1966	70.40	31.37	17.23	1.17	1.52
1967	72.75	32.25	17.83	1.25	1.56
1968	76.42	32.34	17.93	1.23	1.47
1969	85.74	36.27	19.97	1.29	1.47
1970	91.91	36.99	19.80	0.88	0.95
1971	92.91	33.60	16.78	0.63	0.65
1972	103.40	35.42	18.22	0.68	0.68
1973	120.03	42.35	22.63	0.79	0.77
1974	139.67	52.48	26.77	1.21	1.05
1975	142.42	53.66	25.37	1.19	0.90
1976	158.44	58.53	27.50	1.02	0.74
1977	184.82	67.48	32.77	1.14	0.78
1978	217.76	78.58	39.46	1.76	1.11
1979	254.96	95.92	48.50	2.70	1.57
1980	282.80	112.33	55.36	3.57	1.90
1981	315.22	126.54	59.81	3.36	1.62
1982	310.58	120.68	55.35	3.41	1.59
1983	304.78	116.20	53.08	2.91	1.43
1984	353.54	138.38	65.95	3.55	1.77
1985[E]	386.10	155.98	75.24	3.79	1.85

Source: U.S. Department of Commerce, Bureau of Economic Analysis (BEA), Quarterly Report.

[a] Data are company-based (not establishment- or product-based), and represent corporate entities whose principal activity falls in SIC Codes 372 and 376.

[b] Aerospace constant dollars based on BEA's industry deflator for historical data, and Durable Goods deflator for current year estimates.

[E] Estimate.

[r] A comprehensive revision of new plant and equipment expenditures was conducted by the BEA to incorporate benchmarks, retabulations of previous survey data, definitional changes, and recalculations of seasonal factors, bias-adjustment factors, and price deflators. An article describing the revisions in detail and presenting revised annual and quarterly data for 1947-1983 appears in the February 1985 issue of *Survey of Current Business*, the monthly journal of the BEA.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1980-1984
By rank according to net value of NASA prime contracts awarded during last fiscal year
(Millions of Dollars)

Company	1980	1981	1982	1983	1984
TOTAL PROCUREMENTS	$4,843	$5,408	$5,884	$6,797	$7,354
Awards to Business Firms	3,868	4,273	4,806	5,586	5,967
Percent of TOTAL PROCUREMENTS	80%	79%	82%	82%	81%
Rockwell International Corp.	$1,273	$1,471	$1,564	$1,568	$1,402
Martin Marietta Corp.	233	261	310	466	428
Morton Thiokol Inc.	79	105	152	268	322
Lockheed Space Operations Co. ..	(*a*)	(*a*)	(*a*)	19	301
General Dynamics Corp.	46	66	114	156	253
McDonnell Douglas Corp.	160	198	220	237	200
United Space Boosters Inc.	43	65	127	115	197
Bendix Corp.	97	103	109	137	163
IBM Corp.	84	95	107	116	134
United Technologies Corp.	75	71	90	116	118
EG&G Florida Inc.	(*a*)	(*a*)	(*a*)	68	109
Ford Aerospace & Communications	48	62	74	107	106
Lockheed Engrg. & Mgmt. Co. Inc.	59	61	89	101	105
Lockheed Missiles & Space Co. ..	47	43	69	96	102
Computer Sciences Corp.	112	129	138	147	89
TRW Inc.	42	37	44	49	82
Perkin Elmer Corp.	43	51	44	70	79
RCA Corp	32	27	24	57	68
Planning Research Corp.	38	44	55	57	57
Teledyne Industries Inc.	20	23	29	47	52
Boeing Co.	45	40	41	44	44
Singer Co.	28	30	33	35	44
General Electric Co.	114	104	97	85	44
Hughes Aircraft Co.	68	53	40	51	42
Pan American World Serv. Inc. ...	32	34	35	36	40
Ball Corp.	21	30	26	39	39
Northrop Services Inc.	22	24	25	29	32
Raytheon Services Co.	13	15	20	21	28
Westinghouse Electric Corp.	9	7	12	10	26
Sperry Corp.	18	24	26	27	25

Source: National Aeronautics and Space Administration, "NASA Annual Procurement Report," (Annually).

a Not in list of major contractors for indicated year(s).

DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1980-1984
Listed by rank according to net value of
prime contracts awarded during last fiscal year[a]
(Millions of Dollars)

Company	1980	1981	1982	1983	1984
TOTAL CONTRACTS	$76,807	$97,389	$116,660	$128,242	$133,571
McDonnell Douglas Corp.	$ 3,247	$ 4,409	$ 5,630	$ 6,143	$ 7,684
Rockwell International Corp.	969	1,126	2,691	4,545	6,219
General Dynamics Corp.	3,518	3,402	5,891	6,818	5,952
Lockheed Corp.	2,037	2,657	3,499	4,006	4,967
Boeing Co.	2,385	2,683	3,239	4,423	4,564
General Electric Co.	2,202	3,018	3,654	4,518	4,514
Hughes Aircraft Co.	1,819	2,552	3,141	3,240	3,231
United Technologies Corp.	3,109	3,776	4,208	3,867	3,207
Raytheon Co.	1,745	1,826	2,262	2,728	3,093
Litton Industries Inc.	652	1,385	1,317	2,169	2,441
Grumman Corp.	1,322	1,710	1,900	2,298	2,419
Martin Marietta Corp.	809	1,287	2,008	2,272	2,261
Westinghouse Electric Corp.	932	1,125	1,492	1,778	1,944
LTV Corp.	511	548	548	1,343	1,655
Sperry Corp.	845	928	1,149	1,133	1,615
IBM Corp.	497	805	1,197	1,421	1,572
Honeywell Inc.	687	838	1,217	1,114	1,354
FMC Corp.	835	1,052	1,371	1,236	1,157
ITT Corp.	335	380	443	603	1,140
Ford Motor Co.	396	544	897	1,072	1,124
Eaton Corp.	(c)	(c)	337	442	1,117
RCA Corp.	589	877	996	1,181	1,116
General Motors Corp.	509	622	690	893	1,019
TRW Inc.	508	517	869	1,137	983
Texas Instruments Inc.	431	479	584	467	956
Northrop Corp.	1,227	623	1,598	847	882
Avco Corp.	287	493	668	676	873
Textron Inc.	579	479	584	672	805
American Telephone & Tel. Co.	597	695	753	878	768
Allied Corp.[b]	322	458	592	778	759

Source: Department of Defense, "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards," (Annually).

[a] Effective 1980, data include DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

[b] For 1980-1982, data represent Bendix Corporation.

[c] Not in top 100 companies for indicated year(s).

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS OVER $25,000[a] FOR SELECTED MAJOR MILITARY HARD GOODS

By Geographic Region
Fiscal Years 1982, 1983, 1984

Program and Region	Millions of Dollars			Percent of Program Total		
	1982	1983	1984	1982	1983	1984
AIRCRAFT—TOTAL	$23,326	$27,997	$31,796	100.0%	100.0%	100.0%
New England	4,216	3,812	4,324	18.1	13.6	13.6
Middle Atlantic	3,012	3,685	3,758	12.9	13.2	11.8
East North Central	1,787	1,941	2,277	7.7	6.9	7.2
West North Central	4,815	5,206	5,595	20.6	18.6	17.6
South Atlantic	2,649	3,372	3,471	11.1	12.0	10.9
East South Central	194	272	337	0.8	1.0	1.1
West South Central	2,227	3,048	3,330	9.5	10.9	10.5
Mountain	407	311	395	1.7	1.1	1.2
Pacific[b]	4,018	6,350	8,309	17.2	22.7	26.1
MISSILE & SPACE SYSTEMS—TOTAL	$14,271	$16,009	$18,385	100.0%	100.0%	100.0%
New England	1,861	2,070	2,795	13.0	12.9	15.2
Middle Atlantic	804	682	842	5.6	4.3	4.6
East North Central	311	294	270	2.2	1.8	1.5
West North Central	802	845	1,135	5.6	5.3	6.2
South Atlantic	1,557	2,055	1,920	10.9	12.8	10.4
East South Central	168	277	239	1.2	1.7	1.3
West South Central	781	935	1,323	5.5	5.8	7.2
Mountain	1,433	1,340	1,664	10.0	8.4	9.0
Pacific[b]	6,554	7,511	8,196	45.9	46.9	44.6
ELECTRONICS & COMMUNICATIONS EQUIPMENT—TOTAL	$16,125	$18,905	$21,388	100.0%	100.0%	100.0%
New England	1,938	2,091	2,091	12.0	11.1	9.8
Middle Atlantic	3,009	3,494	4,520	18.7	18.5	21.1
East North Central	851	796	1,118	5.3	4.2	5.2
West North Central	829	942	1,977	5.1	5.0	9.2
South Atlantic	2,876	3,536	4,142	17.8	18.7	19.4
East South Central	90	115	129	0.6	0.6	0.6
West South Central	933	1,095	886	5.8	5.8	4.1
Mountain	524	560	759	3.2	3.0	3.5
Pacific[b]	5,076	6,276	5,766	31.5	33.2	27.0

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] Data represent prime contract awards over $25,000, effective 1983, and over $10,000 for previous years.

[b] Includes Alaska and Hawaii.

GLOSSARY

Aeronautics: the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

AIA: Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

Aerospace Industry: the industry engaged in research, development and manufacture of aerospace systems, including manned and unmanned aircraft; missiles, space launch vehicles, and spacecraft; propulsion, guidance and control units for all of the foregoing; and a variety of airborne and ground based equipment essential to the test, operation, and maintenance of flight vehicles.

Aerospace Employment: annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft and missile and space industries (SIC 372 and 376) plus estimated aerospace-related employment in the communications equipment (SIC 3662) and instruments (SIC 381 and 382) industries and in certain other industries (SIC 28, 35, 73, 89, etc.).

Aerospace Payroll: estimated on the basis of average weekly earnings for a given calendar year for production workers plus an estimated annual salary for other employees.

Aerospace Sales: the AIA estimate of aerospace industry sales, developed by summing DOD expenditures for aircraft, missiles, and space-related procurement and RDT&E; NASA expenditures for research and development, and space flight control and data communications; outlays for space activities by other U.S. Government departments and agencies; commercial sales of space-related products; net domestic and export sales of civil aircraft, engines, and parts; FMS and commercial exports of military aircraft, missiles, propulsion, and related parts; and sales of related products and services, including electronics, software, and ground support equipment, plus sales of non-aerospace products which are produced in aerospace-manufacturing establishments and which use technology, processes, and materials derived from the aerospace industry. See also Related Products and Services.

Air Carriers: the commercial system of air transportation, consisting of domestic and international scheduled and charter service.

Aircraft: all airborne vehicles supported either by buoyancy or by dynamic action. Used in this volume in a restricted sense to mean an airplane—any winged aircraft, including helicopters but excluding gliders and guided missiles.

Aircraft Agreement (Agreement on Trade in Civil Aircraft): negotiated in the Tokyo Round of the Multilateral Trade Negotiations, and implemented January 1, 1980, providing for elimination of tariff and non-tariff trade barriers in the civil aircraft sector.

Aircraft Industry: the industry primarily engaged in the manufacture of aircraft, aircraft engines and parts, aircraft propellers and parts, and aircraft parts and auxiliary equipment. A sector of the **Aerospace Industry.**

Airframe: the structural components of an airplane, such as fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as engines, accessories, electronics and other parts that may be replaced from time to time.

Airlines: see **Air Carriers.**

Appropriation (Federal Budget): an act of Congress authorizing an agency to incur obligations and make payments out of funds held by the Department of the Treasury.

Assets, Net: the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

Astronautics: the art and science of designing, building and operating manned or unmanned space objects.

Average Weekly Hours: average hours for which pay was received; different from standard or scheduled hours.

Avionics: Communications, navigation, flight controls, and displays.

Backlog: the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

Budget Authority: authority provided by the Congress; mainly in the form of **Appropriations**, which allows Federal agencies to incur obligations to spend or lend money.

Bureau of the Census: an agency of the Department of Commerce.

Bureau of Economic Analysis (BEA): an agency of the Department of Commerce.

Bureau of Labor Statistics (BLS): an agency of the Department of Labor.

Constant Dollars, see **Deflator.**

Deflator: index used to convert a price level to one comparable with the price level at a different time, offsetting the effect of inflation. The base period, which equals 100, is usually specified as either a given fiscal or calendar year. **Constant Dollars** are calculated by dividing current ('then-year') dollars by appropriate price deflator, and multiplying by 100.

Depreciation: the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

Development: the process or activity of working out a basic design, idea or piece of equipment (see **Research**).

DOD: Department of Defense.

DOE: Department of Energy.

DOT: Department of Transportation.

Durable Goods Industry: comprised of major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered nondurable goods manufacturing industry groups.

Earnings: the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

Average Hourly Earnings: on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid for an incentive plan.

Average Weekly Earnings: derived by multiplying average weekly hours by hourly earnings.

ERDA: Energy, Research and Development Administration. ERDA was formed in 1974 to bring together activities previously scattered among several agencies. The major elements covered were nuclear energy, fossil energy, solar and geothermal energy, conservation through increased efficiency and environmental controls. Most of these functions were assumed by the Department of Energy as of October 1, 1977.

Establishment: the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

Evaluation: (Department of Defense): determination of technical suitability of material, equipment or a system; see **RDT&E.**

Expenditures (Federal Budget): see **Outlays.**

Exports: domestic merchandise including commodities which are grown, produced, or manufactured in the United States, and commodities of foreign origin which have been changed in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States, and which are traded or sold to other nations.

Export-Import Bank of the United States (Eximbank): created in 1934, and established as an independent U.S. Government Agency in 1945, Eximbank is designed ". . . to aid in financing and to facilitate exports . . ." Eximbank receives no appropriations from the U.S.

Congress. It is directed by statute to (1) offer financing that is competitive with that offered exporters of other countries by their official export credit institutions, (2) determine that the transactions supported provide for a reasonable assurance of repayment, (3) supplement, but not compete with private sources of export financing, and (4) take into account the effect of its activities on small business, the domestic economy, and U.S. employment.

FAA: Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

Facility: a physical plant or installation including real property, building, structures, improvements and plant equipment.

Fiscal Year (Federal Budget): until June 30, 1976, year beginning July 1 and ending June 30, and designated by the year in which it ends. Beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end. A three month **Transition Quarter** from July 1 through September 30, 1976, belongs to neither fiscal year.

Flyaway Value: includes the cost of the airframe, engines, electronics, communications, armament and other installed equipment.

Foreign Military Sales (FMS): export sales to foreign governments arranged through the Department of Defense, whereby DOD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

FY: see **Fiscal Year.**

General Agreement on Tariff and Trade (GATT): a multilateral treaty, subscribed to by over 80 governments which together account for more than four-fifths of world trade; its aim is to liberalize world trade; the only multilateral instrument that lays down agreed rules for international trade.

General Aviation: all civil flying except that of air carriers.

GNP (Gross National Product): the market value of the total output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods. It includes the purchase of goods and services by consumers and government, gross private domestic investment and net exports.

Helicopter: a rotary-wing aircraft which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a **V/STOL.**

Heliport: an area, either at ground level or elevated on a structure, that is used for the landing and take-off of **helicopters** and includes some or all of the various facilities useful to helicopter operations such as helicopter parking, hangar, waiting room, fueling and maintenance equipment.

Helistop: a minimum facility **heliport,** either at ground level or elevated on a structure for the landing and takeoff of **helicopters** but without such auxiliary facilities as waiting room, hangar parking, etc.

ICBM: Intercontinental Ballistic Missile, with a range of more than 5,000 miles.

Imports: classified as "general imports" or "imports for consumption." This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials, and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

Income:

Net Operating Income: total net sales (see **Sales**) less total operating costs.

Net Income (Before Income Taxes): **Net Operating Income** plus or minus **"Other Income and Expenses."**

Other Income and Expenses: includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.

Net Income (After Income Taxes): **Net Income (Before Taxes)** less federal income taxes.

Manufacturing Industries: those **establishments** engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials-handling equipment; also establishments engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

Merchandise Trade Balance: the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when **exports** exceed **imports**—a trade surplus—and "unfavorable" when **imports** exceed **exports**—a trade deficit.

Missile: sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, *i.e.*, a weapon which has an integral system of guidance, as opposed to the unguided rocket.

Multilateral Trade Negotiations (MTN): a forum within the **GATT** in which countries negotiate to overcome their trade problems. In September 1973, in Tokyo, over 100 nations launched new multilateral trade negotiations, called the "Tokyo Round," covering both tariff and non-tariff barriers to trade in industrial and agricultural products, and improvements in the **GATT** itself.

NASA: National Aeronautics and Space Administration.

NATO: North Atlantic Treaty Organization.

New Obligational Authority (Federal Budget): see **Budget Authority.**

Non-Aerospace Products and Services: products and services other than aircraft, missiles, space vehicles, and related propulsion and parts, produced or performed by establishments whose principal business is the development and/or manufacture of aerospace products.

OASD: Office of the Assistant Secretary of Defense.

Obligations (Federal Budget): commitments made by Federal agencies to pay out money for products, services or other purposes—as distinct from the actual payments. Obligations incurred may not be larger than **budget authority.**

Orders, Net New: the sales value of new orders (supported by legal documents) minus cancellations during the period.

Other Aerospace Products and Services: all conversions, modifications, site activation, and other aerospace products (including drones) and services, plus research and development under contract, defined as basic and applied research in the sciences and in engineering, and design and development of prototype products and processes.

Outlays: checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

Overtime Hours: that portion of the gross average weekly hours which was in excess of regular hours and for which premium payments were made.

Payroll, All Manufacturing: includes the gross earning paid in the calendar year to all employees on the payroll of operating manufacturing **establishments.** Includes all forms of compensation paid directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other non-payroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

Passenger-Mile: one passenger moved one mile.

Procurement: the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

Production Workers: includes working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use and record keeping and services closely associated with the above production operations.

R&D: Research and Development.

Research: systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either **basic** or **applied** according to the objectives of the sponsoring agency.

Basic Research: with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Applied Research: with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Development: the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods including design and development of prototype and processes.

Independent Research and Development (IR&D): a term devised by the Department of Defense and used by Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

Industrial Research and Development: research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

RDT&E: (Department of Defense): Research, Development, Test and Evaluation.

Related Products and Services: Sales of electronics, software, and ground equipment in support of aerospace products, plus sales by aerospace manufacturing establishments of systems and equipment which are generally derived from the industry's aerospace technological expertise in design, materials, and processes, but which are intended for applications other than flight.

Research: see **R&D.**

Rotorcraft: an aircraft which in all its usual flight attitudes is supported in the air wholly or in part by a rotor or rotors, *i.e.*, airfoils rotating or revolving about an axis (see **Helicopter**).

Sales: net of returns, allowances, and discounts, the dollar value of shipments, including dealer's commission, if any, which have passed through the sales account.

Satellite: a body that revolves around a larger body, such as the moon revolving around the earth, or a man-made object revolving about any body such as the sun, earth, or moon.

SIC (Standard Industrial Classification): a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. See **Aerospace Industry**

for explanation of SIC codes applicable to the aerospace industry.

Space Vehicle: an artificial body operating in outer space (beyond the earth's atmosphere).

Stockholder's Equity: assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures.) For details, see "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations," compiled by the Bureau of the Census.

STOL: short take-off and landing aircraft.

Test (Department of Defense): an experiment designed to assess progress in attainment or accomplishment of development objectives (see **RDT&E**).

Thrust: the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

Ton-Mile: one ton moved one mile.

Total Obligational Authority: the sum of **budget authority** granted or requested from the Congress in a given year, plus unused **budget authority** from prior years.

Trade Balance: see **Merchandise Trade Balance.**

Transition Quarter (Tr. Qtr.): the three-month interval from July 1, 1976 to September 30, 1976. See **Fiscal Year.**

Turbine, Turbo: a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turboprop" or "turbojet."

U.K.: United Kingdom.

U.S.: United States of America.

USA: United States Army, an agency of the U.S. Department of Defense.

USAF: United States Air Force, an agency of the U.S. Department of Defense.

USN: United States Navy, an agency of the U.S. Department of Defense.

USSR: Union of Soviet Socialist Republics.

Utility Aircraft: an aircraft designed for general purpose flying.

V/STOL: vertical short take-off and/or landing aircraft.

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